SEPTEMBER/OCTOBER 1988
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COMMODORE Disk User

FOR C64 AND C128 USERS

IN THE MAGAZINE

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CONTENTS

IN THE MAGAZINE

Update 4
Commodore disk news

Disk instruction 6
How to use your CDU disk

How to contribute 7
Send us your programs and articles

Reviews 8
Latest Commodore disk releases

Which assembler? 28
What they are and where to get them

US Gold 30
All-American plans revealed

High-speed graphics 33
How to set your C64 up for speed

Disk Dungeons 35
This issue's adventure column looks at EA's Wasteland and Bard's Tale III

Bulletin Boards 38
How to get online

Bytes Dog Man 40
Take the mystery out of hex arithmetic

ON THE DISK

Scorpion 12
If it moves, kill it

Colour Match 13
Tailor your C64 screen colours to your taste

C128 Spreadsheet 14
Accounts can be simple

Escape 18
Can you find a way to escape the Nazis?

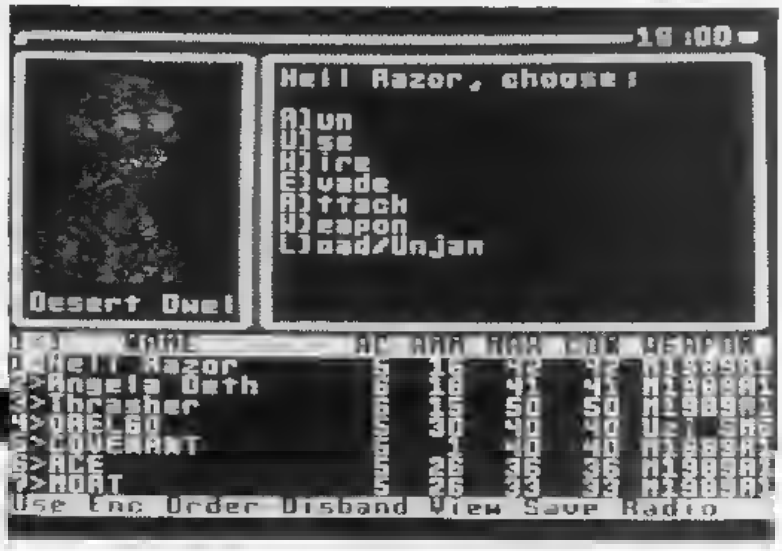
Starburst 18
Your chance to save the Galaxy

Score Keeper 19
Using sprites for your game scores

Addit 20
A tactical numbers game

Location finder 25
Find out what that bit of code s up to

Fractal Frolics 26
Fun with the Mandelbrot set



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Update

What's going on, who's doing it and where it's happening

Bytes Into The Apple

Big Apple Entertainment's boss, Terry Ashton, has designed his own disk storage box based on cigarette packet technology. The flip top units are made from a single sheet of laminated plastic and will withstand over 300 openings and closings.

The boxes will be used to package the company's latest game Oops! which is probably the sound emitted after opening the box for the 300th time.

The Oliver twins with the late Dizzy.

Sob Story

Code Masters have realised that more and more Commodore owners are buying disk drives and that there's now a major market waiting to be turned on by budget priced disks.

Code Masters' other dynamic duo, the Oliver twins, have a sad tale to tell which relates to Dizzy, the hero of their latest game. Dizzy, an egg shaped creature with arms and legs, became such an obsession with the boys that they just had to turn the screen into a reality. So it was that Dizzy the doll was born.

Against their better judgement, the twins decided to allow a magazine to offer Dizzy as a competition prize.

Readers of a nervous disposition should move on to the next news story at this point. The magazine staff, who are obviously no respectors of the code of kindness to inanimate objects, indulged in a simulated bout of Code Masters bating and literally kicked the stuffing out of the poor creature. A desperate dash to the local doll's hospital proved fruitless and Dizzy was pronounced dead on arrival.

The aggrieved Olivers were distraught when they heard of the egghead's demise but can gain comfort from the fact that Dizzy lives on, in spirit at least, through the Commodore 64 screen.

Before we leave Code Masters, did you know that the budget range is now available on disk? Pop into your local supplier and you'll be pleasantly surprised to find an expanding range of disks at £2.99.

What's Up Doc?

Roll up! Roll up! My friends, we have not one, not two but three preparations for the Commodore 64. The products are the results of serious research at the Trilogic laboratories and can make the misaligned tape read once more, help the ailing 1541 to drive and the lame 64 to work! Each formula is easily applied to the troubled area and a diagnostic report is produced in minutes.

The Datasette Doctor is a curative for tape loading errors. Drive Doctor, reviewed in this very magazine, is for badly aligned disk drives and the new Commodore 64 Doctor can give your computer a full physical checkup.

Guaranteed more accurate than the age old method of grasping the joystick while the computer coughs, the 64 Doctor will perform a complete chip check to ensure that all is well and report any infirmities to the screen display. For prices contact Trilogic on (0274) 691115 or send a missive to Unit 1, 253 New Works Road, Bradford BD12 0QP.

Commodore Disk Deal

RPS has been appointed the official manufacturer for Commodore branded disks in the UK. The deal extends last year's agreement between the two companies which solely covered the West German market.

The RPS disks are manufactured in France and will be distributed in the UK by Loughborough-based company SJB Disks. Commodore's marketing manager for the UK, Dean Barrett said of the deal, "We are convinced that this agreement will guarantee the highest quality product for our users and, importantly, provide total support for our dealers".

The reverend Dean Barrett, CBM, gives his blessing to the marriage between RPS and SJB Disks. (Ivor Norkett and Steve Burke).

Magazine Strategy

Strategic Studies Group are ensuring a longer active life for their products by the introduction of their magazine, RUN 5

Each issue is packed with additional scenarios for use with the SEG design kits included in each program. This means that the strategic elements can be varied to sustain interest and increase the value for money aspect of each pack.

Back home in Australia the magazine has been running for a couple of years and the first issue over here is the ninth in the quarterly series. Apart from the scenarios there's also a lot of background information which brings everything to life, and letters pages with hints and tips on tackling each gameplay situation.

RUN 5 is available from SSG's distributors, Electronic Arts as well as from some of the better UK dealers. The magazine costs £2.50 per issue and further information can be obtained from EA's Customer Service on (0753) 46465

The Big Show

The PCW Show is dead, long live the PC Show. Despite the name change and new Earl's Court venue, the Personal Computer Show promises to break all its previous records.

Despite the increased size of this year's extravaganza, almost all of the stands are booked up ready for a feast of new products that will have every Commodore disk drive smacking its lips in anticipation. Last year, over 90,000 people attended the Show but with the increased interest from overseas exhibitors and the larger venue, the attendance record may spill over into the 100,000 bracket.

The Show is open to the general public from 16th-18th September but trade visitors will be able to avoid the crowds by visiting on the 14th and 15th.

Hewson Lets Go

Peace has now broken out between Hewson and Telecomsoft over the rights to Graftgold's Morpheus and Magnetron games. The battle has been raging for the best part of a year since Graftgolf defected to Telecom with the two games developed under Hewson's patronage

Both parties claim to be happy with their agreement but have refused to make any further comments on the situation

The Bard's Sales

The announcement that Interplay Productions has signed an agreement which appoints Electronic Arts as its European distributor comes as no surprise. A glance at the previous issue of CDU announced EA'S release of The Bard's Tale III, Interplays current flagship series

Interplay plans to broaden its horizons beyond the fantasy role playing scene which should allow them to release between four and seven games each year. One new product will be called Battle Chess, a game which combines the strategy of chess with combat action, which sounds a little like EA's own Archon games don't you think?

Another science fiction game is also in Interplay's pipeline. Based on the Hugo and Nebula award-winning novel by William Gibson, Neuromancer is being developed in conjunction with one Timothy Leary. Could this be the same Leary of Politics of Ecstasy fame, the onetime high priest of the LSD drug cult? Psychedelic!

The Interplay team with their president, Brian Fargo, in the foreground.

DISK INSTRUCTIONS

Before you use your disk for the first time read this

We have done our best to make sure that Commodore Disk User will be compatible with all versions of the C64 and C128 computers and their associated disk drives

Getting the programs up and running should not present you with any difficulties at all, simply put your disk in the drive and enter the following command

LOAD "MENU",8,1

Once the disk menu has loaded you will be able to start any of the programs simply by pressing the letter that is to the left of the program that you want to use

C128 users please note that you should be in C64 mode when using the disk. You can enter C64 mode by either

i) Holding down the Commodore key (bottom left of the keyboard) when turning the computer on or,

ii) After turning the computer on type G064 and answer "Y" when prompted "ARE YOU SURE?"

It is possible for some programs to alter the computer's memory so that you will not be able to LOAD programs from the menu correctly until you reset the machine. We therefore suggest that you turn your computer off and then on before loading each program.

Disk Failure

If for any reason the disk with your copy of Disk User will not work on your system then please carefully re-read the operating instructions in the magazine.

If you still experience problems then

1) If you are a subscriber, return it to:
   INFONET LTD
   5 River Park Estate
   Berkhampsted
   Herts. HP4 1HL
2) If you bought it from a newsagents, return it to:
   Disk User Replacements (BBC or Commodore as appropriate)
   DISCOPY LABS
   20 Osyth Close
   Brackmills
   Northampton NN4 0DY.
   Telephone. 0604 760261

Within eight weeks of publication date disks are replaced free

After eight weeks a replacement disk can be supplied from DiscCopy Labs for a service charge of £1.00. Return the faulty disk with a cheque or Postal Order made out to DiscCopy Labs for £1.00 and clearly state the issue of Disk User that you require. No documentation will be provided

Please use appropriate packaging, cardboard stiffener at least, when returning a disk. Do not send back your copy of the magazine – only the disk please

How to copy CDU files

You are welcome to make as many of your own copies of Commodore Disk User programs as you want, as long as you do not pass them on to other people, or worse, even sell them for a profit

For people who want to make legitimate copies, we have provided a simple machine-code file copier. To use it, simply select the item FILE COPIER from the main menu. The copier works with a single drive, is controlled by means of the function keys as follows

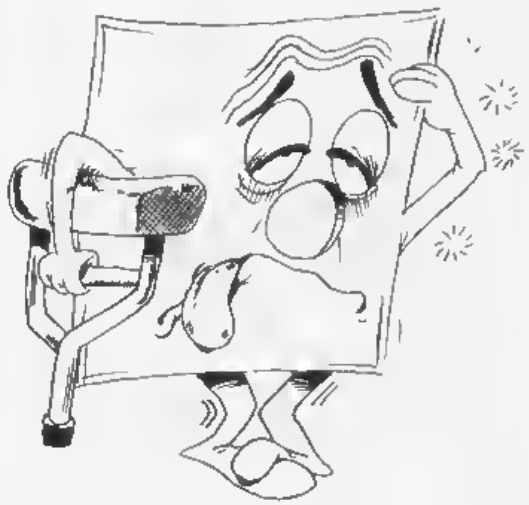
F1 Copy file - the program will prompt you for a filename

F3 Resave the memory buffer - you may get an error on a save (perhaps you left the drive door open). Use this to try again.

F5 Disk commands - allows you to enter any regular C64 disk command

F7 Displays the directory

F2 Exits the program and returns you to Basic



Contributions

Written some programs? Got some programming wisdom to pass on? Or do you want to write about your own fields of interest? We're waiting for your contributions

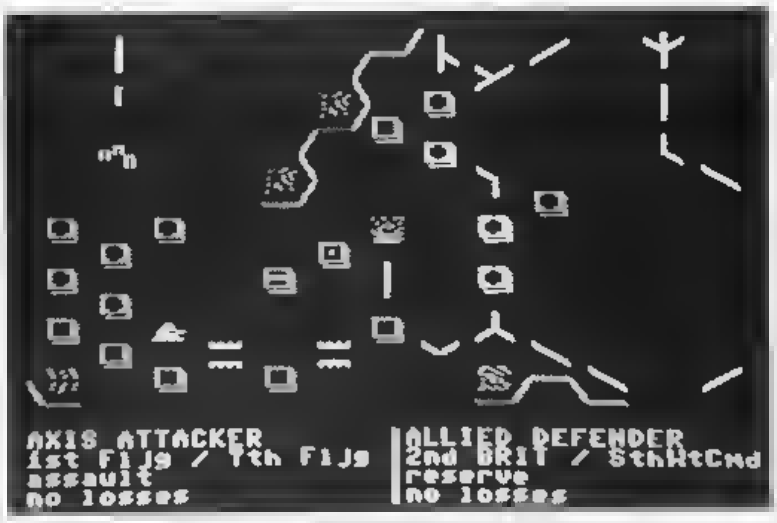
Commodore Disk User doesn't just offer you the chance of appearing in print, but of putting your programs on our disk for all to admire. We're always on the lookout for new programs for the disk. Anything goes, utilities, games or business programs in Basic or machine code - if we think it's good, we may well publish it.

Even if you haven't got a program to send, we'd love to pick your brains. If you have a field of expertise you'd like to explain or any tips and hints of interest to disk users, send them in.

But how do you go about preparing a submission? Just follow the guidelines and all should go well. You don't have to be a great novelist to contribute, but if you follow our simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.
2) All text should be double-spaced, i.e. there should be a blank line between each line of text. You should also leave a margin of at least 10 characters on each side of the text.
3) On the first page you should put the following:
   Name of the article
   Machine that it is for (C64/128)
   Any extras required - disk, printer, add-ons etc.
   Your name
   Your address
   Your telephone number
4) The top of every page should have the following information on it:
   Abbreviation of the article title
   Your name
   The page number
   For example, suppose you had submitted a piece on C64 3D graphics. You should put something like this at the head of the page:
   3D/G Brown/1
5) Please make sure that you do not make any additional marks on your text, especially underlining.
6) Try to write in clear concise English. Your contribution does not have to be a great work of literature, but it must be comprehensible.
7) On the bottom of each page you should put the word MORE if there are more pages to the article, or ENDS if it is the last page.
8) If possible, enclose a listing of all programs.
9) Use a paperclip to hold the pages together. Do not staple them.
10) When submitting programs for the disk, submitting the program alone is not enough. Please tell us how to load, run and use it, preferably in as much detail as possible. If there are any interesting programming point involved, explain them to us.
11) Please do not submit machine-code programs as Basic loaders of the sort certain other magazines would accept. If you have any points, however, to make about the working of the program, an assembler source file on the disk would be handy, preferably for Your Commodore's Speedy Assembler.
12) Programs for the disk should be in as few chunks as possible. This makes our disk menu easier to set up.
13) Programs under 10 lines can be included in the text. If your program is longer than this it must be on a disk.
14) If your article needs any artwork, then supply clear examples of what you want. We don't expect you to be an artist, but we do need to see what is required.
15) Photos, if necessary, must be either black and white prints or colour slides. We can take shots ourselves, so don't worry about this too much.
16) Submissions of any length are welcome. A five-line routine may be just as welcome as a six-part series of 2000-word articles.
17) Payment varies quite a lot and depends on quite a number of factors, such as complexity and presentation of program. For articles, the number of magazine pages taken up is the salient factor.
18) All payments are made in the month that the magazine containing your article has appeared in print.
19) If we do find your submission suitable for inclusion in the magazine, we will write to you giving the terms of publication, the rate of payment, and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.
20) If you want the program to be returned to you, should we find it suitable for publication, then you should enclose a stamped addressed envelope.
21) If you use a wordprocessor, then enclose a copy of your text on the disk and state clearly which wordprocessor you use.
22) Send your programs and articles to:
   Commodore Disk User
   Submissions
   1 Golden Square
   London W1R 3AB
23) Commodore Disk User cannot accept any liability for items sent to the magazine.

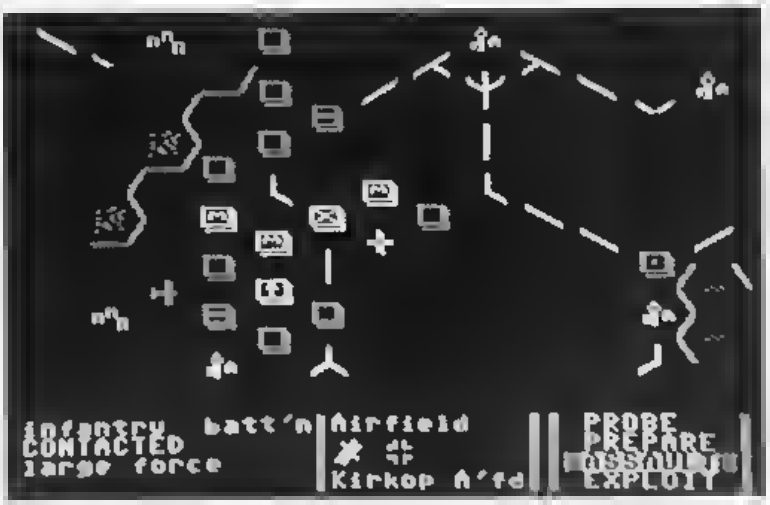
Reviews



ROMMEL

By early 1941, the war in North Africa was going badly for the Germans. The Italian army had been routed out of Egypt and was almost out of Libya as well

A small German force, lead by General Irwin Rommel was despatched to stem the tide In the next two years, although outnumbered and badly supplied, the Desert Fox out-witted and out-generalled all of his opponents. In this series of simulations you can take either side and refight the battles of Syria, Sidi Rezegh, Cauldron, Alem al Halfa, Kasserine, Maknassy and Tebourga Gap



The package is completed by an eighth scenario for the hypothetical invasion of Malta which despite six working Axis plans never took place The scenario is based on one of these plans and creates an interesting conflict between the invading Germans and the defending forces that although greater in number consist mostly of fixed coastal defences.

Whatever scenario you choose you can decide to play either side and bias the number of victory points gained or lost for each objective to balance a game between even a novice and an experienced opponent.

The objectives mentioned above include airfields, hills and towns and help simulate the actual battle as the occupier of each objective gains points for every turn they hold them and the player with the most points at the end of the game, wins it

The game uses SSG's Battlefront game system and so will be familiar to anyone who has played Battlefront or Halls of Montezuma and follows the usual format of the player issuing orders to regiments in the divisions in his command and then observing as the orders are carried out by the computer.

This gives you limited but effective control over your men without climbing into the mud with them as you can decide whether they will hold, advance, attack a specific location or unit, probe the enemy, prepare or launch an assault and allocate off map air and naval gun support This leaves you time to plan your strategy without getting bogged down in moving every single unit across every map square.

The package which is up to the usual high SSG standard consists of a game disk, instruction and scenario briefing manual, colour maps, guide to the game menus and save disk labels also includes the Warpaint program through which you can edit or create your own scenarios.

SSG wargames including Rommel are now available in the UK through Electronic Arts who signed them up after reading the feature in *Commodore Disk User*. Thankfully the excellent packaging has remained the same and the price has been cut almost in half Electronic Arts also import RUN 5 the SSG magazine that includes details for new scenarios that can be created through Warpaint **TH**

At a glance.

Title: Rommel.
Supplier: SSG (Electronic Arts, Langley Business Centre, 11/49 Station Rd., Langley, Slough, Berks., SL3 8YN **TEL:** 0753 49442.
Price: £18 95.
Graphics: Units and terrain
Sound: N/A
Playability: Menu driven.
Addictiveness: It'll get you on the war path

THE PRESIDENT IS MISSING

In what's described as an interactive graphics adventure simulation you are installed by the Vice President as a special investigator. Your mission is to find the President and nine other world leaders who have been abducted in a terrorist raid on an economic summit.

The terrorists have issued their demands that include the destruction of the state of Israel, removal of Western influences in the Arab world and return of all assets to the new nation of Islam.

The time bomb of the Islamic fanatics looks set to explode but somehow you must stay calm and find out where the leaders are and bring those responsible to justice.

To help you in this mission you have at your disposal the resources of the US intelligence services that range from the official reports on the kidnapping to eight field agents that can travel anywhere in the world.

From the reports you learn that the summit was moved from its original venue in Zurich at the last minute to "somewhere" in Lichtenstein. The area was to be patrolled by Swiss troops and that the leaders were only informed of the move through instructions from security agents. The terrorists launched a well timed raid using unmarked helicopters together with Russian made gas bombs that hampered any possible rescue attempt.

The Swiss did track the escaping terrorists until they dipped below radar tracking height just North of the Adriatic coast coincidently not far from where a Russian trawler was sailing off the coastline.

By now you're beginning to think that there's more to this than a simple but feared terrorist kidnapping and wonder how much the Russians are involved and puzzle over who leaked the confidential security details.

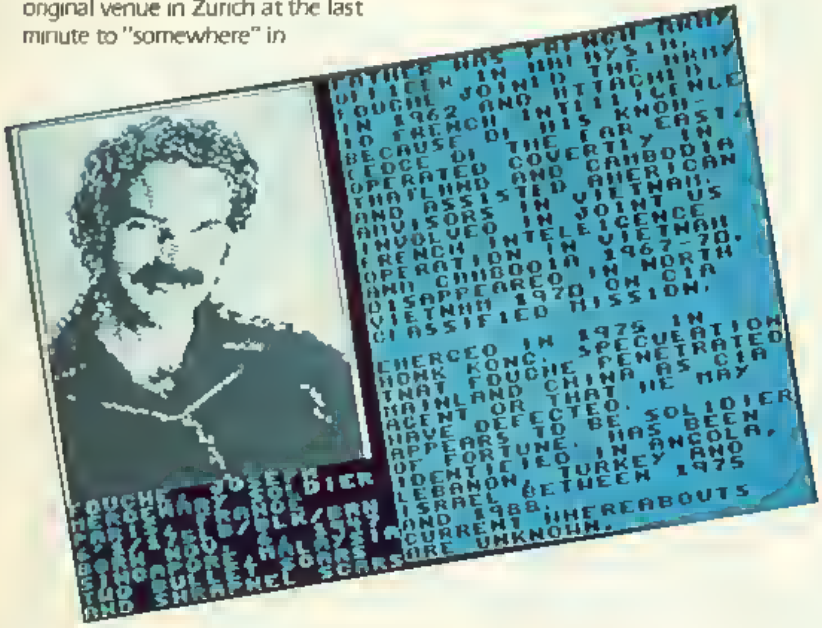
Perhaps the answer lies in the 30 minute audio tape that is supplied with the game disk that includes to kidnappers demands, voices of the President and the French Premier, a speech made at Oxford University several years earlier describing terrorists as freedom fighters and some brief but enticing lines of morse code that will have you searching for the encyclopedias.

Now you're on the trail you can examine some of the pictures held in the picture file and even zoom in to examine close detail which just might reveal an important clue.

However, your success or failure will depend on how well you use your eight field agents. These will follow almost any instruction and will go anywhere in the world and return and report. Therefore it is crucial to give them clear and concise instruction or they'll waste valuable time on pointless and time consuming wild goose chases.

The President is Missing is a tense thriller that will remind many of the first part of the Fourth Protocol, but this game goes a lot deeper and marks a fine debut for Cosmi in its new style as a serious simulation software house. It's hard to believe that the same company also produced the gory Forbidden Forest and the tasteless Chenobyl. ▶

TH



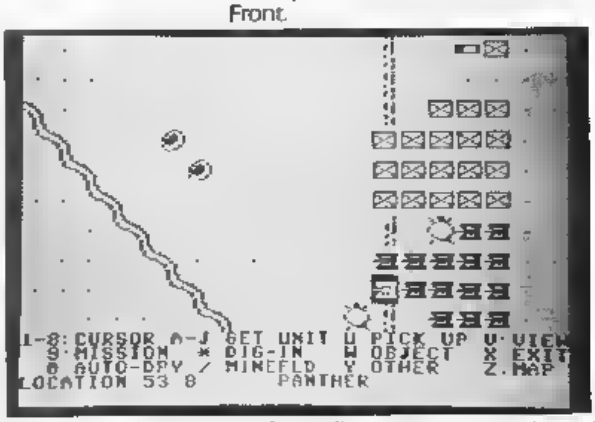
At a glance.

Title: The President is Missing.
Supplier: Cosmi (Microprose), 2 Market Place, Tetbury, Gloucs, GL8 8DA. **TEL:** 0666 54326.
Price: £19.95
Graphics: Black and white but atmospheric.
Sound: N/A
Playability: Some rough edges
Addictiveness: Tense

Panzer Strike!

The moment you open the box you can tell you're going to be up at all hours slugging it out with the Tigers on the Russian steppes. Panzer Strike!, the latest in tactical armoured warfare from SSI, consists of two disks, containing scenarios from three different theatres of war and a game construction kit plus a 53-page manual and a 'briefing manual' containing details for a vast array of weaponry covering the entire Second World War.

You can play this game in three entirely distinct ways. Firstly, and most people will want to do this straight off, you can play one of the setpiece historical scenarios provided. These cover three Western Front battles, and two apiece in North Africa and the Eastern Front.



Secondly, you can construct a custom game of your own. A huge range of preset weaponry and types of military formation are available, covering even minor allies on both sides, such as the Rumanians and Poles. These presets can be edited to give you even more flexibility.

Panzer Strike's map editor is one of the most versatile I've seen. You can, if you wish, specify every single square of terrain, or you can just ask the program to generate a cluster of random squares of a given terrain type around a specific location. You can even put in roads in this way.

Finally, and perhaps most interestingly, you can play a campaign game, starting with the weaponry and formations of a given period and theatre and upgrading to newer weaponry after each battle, should this become available. The computer obligingly generates terrain and opponents for you for each encounter, although you can modify your initial deployment.

Although Panzer Strike suffers a bit from SSI's 'Apple II' look, the company has now taken to offering a choice of map scales, so you can get some better looking graphics by switching to the smaller scale map. Unfortunately, Gary Grigsby, who also designed Battlecruiser and Warship, still refuses to recognise that the C64 has joystick ports. As a result, this game employs SSI's ridiculous system of moving the map cursor using the number keys from 1-8.

But that's only a minor flaw. As one would expect from a designer of naval games, the action in Panzer Strike! is very fluid. A wide range of orders can be issued to your units in the Orders Phase, and this is then followed by three game 'pulses' in which these orders are executed. One nice touch is that the overall supply of orders is limited (although you can turn this feature off), so you may find yourself with important units that you can't move.

Command and control is important in this game - orders can be issued either to individual units or to their formation HQs, and units can be lost to control either by moving too far away from HQ, or by the HQ being destroyed, in which case the computer controls the subordinate units, usually in an infuriating fashion.

What with all these features, including bells and whistles I haven't mentioned, there's something of a learning curve involved in this game. Once you've played through one of the historical scenarios a few times you do come to realise, however, that the program isn't too bright an opponent. I found that Marginal Victory became a matter of course very soon, although gaining a Decisive Victory isn't always so easy in the time available.

Well, it's hard to program computers to play wargames well against humans. Look at chess, which is an extreme simplification of the sort of mobile warfare, so I'm inclined to be understanding about this.

Besides, there are a number of ways that you can still keep the interest going here, even if you feel that victory is inevitable. You can always play any of the games against a human opponent or you can change the handicap level to favour the machine.

The option I find best is to avoid replaying battles, particularly when working through a campaign. This way, you can pride yourself on reacting correctly with no knowledge of the opponent's initial deployment, and winning depends on getting a fast feel for the terrain.

Any way you cut it, Panzer Strike! is excellent and lasting value for money. It isn't so much a game as a complete gaming system, and speaking as a badly jaded reviewer, this is a package I'll be coming back to again and again. **FF**

At a glance

Title: Panzer Strike!
Supplier: Strategic Simulations Inc US Gold, Units 2/3 Holford Way, Holford, Birmingham B6 7AX
Tel: 021-356 3388
Price: £24.99
Graphics: Still Appleish, but showing some improvement
Sound: Explosions, gunfire etc (what more would you expect to hear? Screams?)
Playability: Takes some learning to get the best out of the game. Needs some joystick control
Addictiveness: Turns a committed pacifist into a (simulated) armoured warfare junkie

Samurai Warrior

Following on from the adventures of Miyamomoto Usagi (or Usagi Yojimbo) in his own black and white comic, the Rabbit Ronin appears for the first time in a computer game.

The general gameplay is pretty predictable, you play Usagi (a masterless Samurai warrior) destined to roam as a mendicant. On your travels you come across various different enemies (underlings of the evil lord Noryuki) who are out to kill you.

The game is played on a sideways scrolling landscape and this movement is quite smooth, as is the movement of Usagi. Your enemies hide in trees, bushes, under bridges, in houses and there is a nasty rhino to take on at the end of the first screen.

The sprite movement on the screen is quite smooth with very little flicker. The music is suitably dumb – certainly no accompaniment to the game's hack and slay – after five minutes you'll be reaching for the volume control on your monitor or TV screen.

So what do you have to do?

You have to be nice to poor peasants and the workers in the paddy fields. Give them some money and you get spiritual points. Kill them and you have to commit hara kiri in order to atone for your sins. Initially, all you have to do to get from one level to the next is to kill a few of your ninja enemies (anthropomorphic cats no less), and run like hell. If you run for too long, or run away from too many of your enemies, you end up committing hara kiri simply because you are a coward.

The game is very difficult to play – especially at lower levels. I had been playing Samurai Warrior for days before moving off onto level two. After a while, I got used to the way the game played, and I started making quick progress, shooting through the levels with relative ease.

The backgrounds are nice and fairly colourful, but they do become pretty samey after a while. The music doesn't change, and the general hack and slay does tend to become pretty boring.

Samurai Warrior does, however, have its saving graces, the characterization of Usagi, our Rabbit hero, is very very good. The top left hand side of the screen has a detailed picture of Usagi showing his "status". When he is angry, he growls, when he is hurt he looks shocked, and when he is walking (ie, he is not being attacked) then he just looks inscrutable!

The game takes a while to load, but there is minimal disk loading between levels, so you will not have to wait around for screens and new sprites to be loaded from disk. A shame that the music couldn't change a little more than it does, but movement and character animation is very good, making up for many of the game's other failings.

Usagi Yojimbo is a cult comic character published by Fantagraphics in the USA, and it is surprising to see a predominantly British game by a British company – to many, the Rabbit Ronin is just another weirdo computer game character, to readers of his own comic, he is the hero, doing right, and being fair at all times.

Okay, so the game doesn't put this across very much, but this supposed lack of detail doesn't detract from the game very much either. Had a little bit more care been taken over the presentation of the game, perhaps it would have been something very special, but as it stands, Samurai Warrior is a bit too much like all the other scrolling hack and slay games (such as Rolling Thunder, Rim Runner etc).

Great if you read the comic, otherwise it is pretty so so.

CG

Artwork Copyright Stan Sakai from the fantagraphics Comic USGI Yoyimbo

The Comic? Well, Usagi first appeared in Albedo, a funny animals comic. Stan Sakai's character proved to be so popular that he moved into his own comic last year, and he has never looked back since!

Usagi Yoyimbo is not just a hack and slay comic (like so many of its peers), but an amazing example of how American and Japanese storytelling can come together in weird and wonderful ways.

At a glance

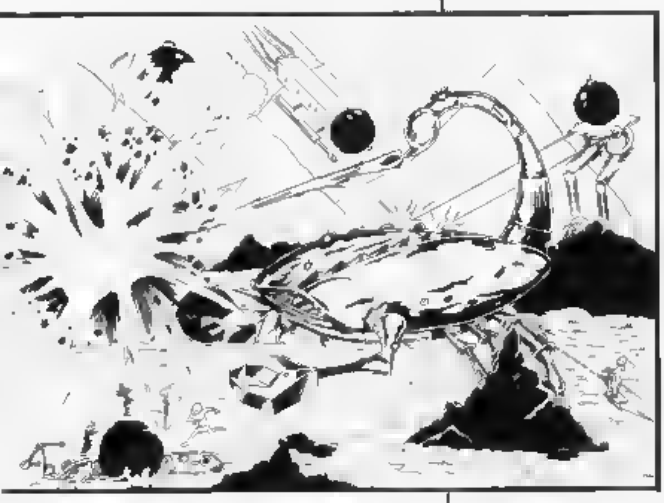
Title: Samurai Warrior
Supplier: Firebird Software, 64-67 New Oxford Street, London WC1A 1PS
Tel: 01-379 6755

Graphics: neat sprites, smooth scrolling - what more could a game ask for?
Sound: suitably dumb
Playability: difficult to begin with, but easy once you get into it!
Addictiveness: not a lot!

Scorpion!

Blast your way through deep space as pilot of the galaxy fighter Scorpion

By Leslie Wigmore



Big place, the Galaxy. But not big enough. It's all summed up in Semionovich's First Law, a sociological corollary of the famous Lorentz-Fitzgerald equations. Semionovitch broadly stated that, just as it is completely unfeasible to achieve the speed of light within the constraints of normal space-time, it is similarly impossible for any intelligent lifeform to attain the point at which it is satisfied with its supply of resources and living space.

Of course, just as the Lorentz-Fitzgerald equations were overthrown by Grace's Hypergeometry Theory in 2243, so Semionovitch may yet be disproved.

Tell it to the Space Marines. Our job, as an unbiased multi-racial peacekeeping force is to keep those lifeforms who insist on obeying the Semionovitch dictums in line [the expression 'blowing them away' is frowned on in the modern SM. We prefer 'keeping the peace with maximum prejudice']. The finest tool of the Space Marines is the galaxy fighter Scorpion.

Now you too can sample the danger and excitement that a spell in the Space Marines offers you. Just drop in at your local recruiting office and ask to try our Scorpion simulator. You will incur no obligation.

We stress that the brain-to-computer input techniques used in the Scorpion simulator are entirely non-invasive –only the sensory centres of the brain are stimulated. The fact that 99 percent of simulation users subsequently join up can simply be attributed to the excellent terms and conditions of service contained in our standard 99-year contract.

Well what are you waiting for, kid? Hit that simulation. We'll see you in the Marines.

To use the simulator, a joystick in Port 2 is required. All potential recruits are required to achieve total joystick functionality for themselves.

SPACE MARINE RECRUITING POSTER, CIRCA 2315

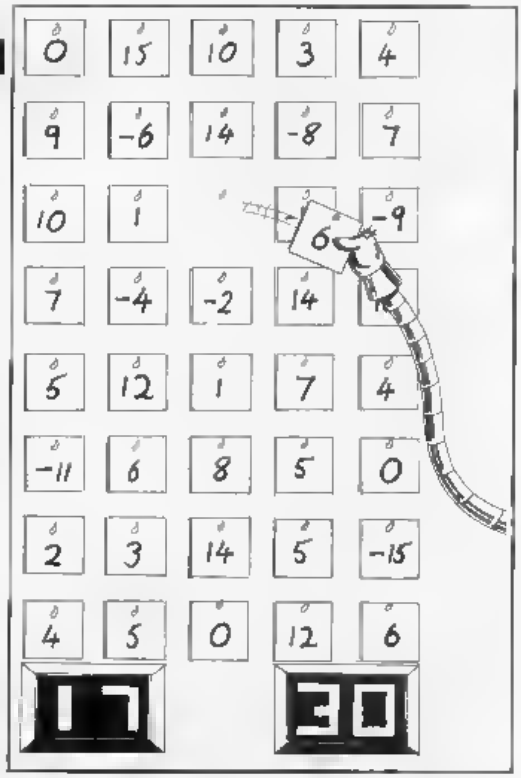
Loading the program

To load Scorpion outside the menu enter LOAD "SCORPION", 8 and RUN

ON THE DISK

Addit

Pit your wits against your Commodore with this deceptively simple strategy game



Addit is a strategy game for two players which allows you to challenge either the computer or another human player. At first sight, it looks ridiculously simple, but you will need to look ahead very carefully to overcome the computer player.

You start with a matrix of random numbers, some positive and some negative. The cursor indicates your position on the matrix, and you can move it either horizontally or vertically (against the computer you always move along a horizontal row).

You can claim the number under your cursor by hitting Return, in which case it's added to (or subtracted from) your score. This then enables the opponent to move along their direction, but beware – you can easily let them trap you into having to claim a negative number. The successful player will need to look ahead at least three moves. It's not easy.

Loading the program

To load Addit outside the menu, just type LOAD "ADDIT",8 and RUN.

Colour Match

It isn't at all obvious which colour combinations will work when using C64 graphics and text. Here's a little routine which will sort it all out for you.

By David Butcher

Colour Match provides you with a way of checking which combinations of two colours will work on your monitor or TV, whether you are using colour, green screen or black and white.

The program displays all 256 colour combinations on screen and then asks you to grade them out of three (1 is poor, 3 is good). It will then display your chart on the screen.

You then get another chance at it to check the colour combinations in black and white (you will need to adjust your set for this).

The important thing about the program is the subjective factor – you can guarantee that no two people's charts will be the same.

Loading the program

To load the program outside the menu, enter LOAD "COLOUR MATCH",8 and RUN.

ON THE DISK

Mini Spread 128

CDU sets out to fill your accounting system requirements with this comprehensive business program

By Kevin Blight

A mini spreadsheet for the Commodore 128, Mini Spread is a small spreadsheet of a set size, 100 rows by 25 columns, giving a total of 2500 cells. For the uninitiated, a spreadsheet is similar to a large piece of paper separated into rows and columns. Each box on the sheet is known as a cell. Each cell may contain either text, a value or a formula. Text may be any of the alphanumeric characters (graphics characters will be ignored). A value may be any value in the range +9999999.98 to -9999999.98, as you can see, a spreadsheet can handle very large numbers. A formula is used to perform calculations on specific cells within the spreadsheet, which will be explained in full

Each cell is a set size of 11 characters wide, this cannot be changed. The rows of the spreadsheet are labelled alphabetically on the left-hand side of the screen. The first 26 rows will be preceded by 'A' with the letters A-Z following, e.g. row 1 will be displayed as 'AA', row 26 will be displayed as 'AZ' following, e.g. row 27 is displayed as 'BA', row 52 is displayed as 'BZ'. This continues with 'C' for rows 53 to 78 and 'D' for rows 79 to 100. Row 100 has the label 'DV'. The columns are numbered consecutively from 1 to 25.

The screen displays 102 cells at a time and a cursor is not used as this would entail considerable movement to get around the screen; instead you will be asked for the row and column to enter details in. Mini Spread uses a number of single character commands to access its powerful functions.

The commands

Each command is listed in detail with examples provided where required. A summary of each command is given in Appendix B for quick reference.

To load Mini Spread place the disk in the disk drive and hold down Shift and press Run/Stop. Mini Spread will now load and execute; when a blank spreadsheet is displayed on the screen with the command prompt on the bottom line, Mini Spread is ready for you to use.

The current file name is displayed at the top left-hand corner of the screen, when first loaded this will be shown as 'NEW'. As soon as you load a spreadsheet from disk or save a spreadsheet to disk this will be replaced by the name you used for the load/save.

The screen display can be thought of as a window, showing only part of the large piece of paper at any one time. The window may be moved in a number of ways using +, -, cursur up and cursor down (only the cursor up and down keys next to the function keys are recognised with CONTROL). The window will show 102 cells at any one time.

Each command, including the ones which move the screen display, will now be explained in detail.

CURSOR UP: This command is used to move the screen up 1 row. Holding down CONTROL while pressing this key will cause the screen to move up 1 screen (17 lines).

CURSOR DOWN: This command is used to move the screen down 1 row. As with CURSOR UP, using with CONTROL will move the screen down 17 lines or 1 screen.

+: This command is used to move the screen right 1 column. Holding down CONTROL while pressing this key will move the screen right 5 columns.

-: This command is used to move the screen left 1 column. As with +, using with CONTROL will move the screen left 5 columns.

C: This command is used to copy a formula to a number of cells in a row or column, re-referencing them to the correct row or column as it goes. This is very powerful when setting up spreadsheets with a large number of formulas. In most spreadsheets a lot of formulas are the same but repeated on a number of columns or rows. The following example will show how this command can be used to speed up the entry of formulas

Examp e 1

	1	2	3	4	5
AA		JANUARY	FEBRUARY	MARCH	APRIL
AB	PURCHASES	126 45	48.83	10 96	110 20
AC	ADVERTISING	45 00	30 00	132 50	25 00
AD	POSTAGE	15 25	10 47	10 90	38 45
AE	TOTAL				

In this example a total is required on row AG for all the columns 2 through to 5.

First you will be asked if you wish to copy a row or column, this would be 'C' in the above example as the column will change in the formula. Next you are asked for the other reference, the row or column where the formula will be placed. In the above example this would be row 'AG' as this is the fixed row where the total should appear.

Next you will be asked for the formula to use, in this example this would be 'TOT AA02-AD02'. The formula is not checked as it would be if entered using the command 'F'. Now you will be asked to enter the variable part of the formula, in this case it will be 02 as the row will change.

Now the formula will be re-displayed for you, and you will be asked to enter all the variable positions where the formula is to be placed. In this example enter '02', '03', '04' and '05'. Now press Return to exit this command and return to the command prompt. To check that the formulas have been set up correctly press 'R' and then 'D' to review all the formulas on the sheet; the new formulas should be displayed, with the correct column references.

D: This command is used to display a formula stored in a cell. You will have to enter the row and column for the cell you wish to display. The formula will be displayed on the screen – to return to the command prompt press any key. If the cell does not contain a formula a message will be displayed.

F: This command is used to enter a formula in a cell, each formula can be up to 30 characters long. All alphanumeric characters can be used in a formula. You will be asked for the row and column to place the formula in. If you press RETURN when asked for either the row or the formula, you will be returned to the command prompt. Once a formula has been entered it will be checked. The checking will not pick up errors where the range of cells do not contain values, but will reject any formulas where the formula is in the wrong format,

e.g. If you try to enter a formula such as 'TOT AA04-AA02' it will be rejected with the message INVALID FORMULA. This is because the column references 04 and 02 are the wrong way around.

H: This command is used to gain help when in Mini Spread. The spreadsheet will disappear and will be replaced with a help screen. There are three help screens available, the first will show the commands available from within Mini Spread. The second shows how to move around the screen. The third shows all the available functions when using formulas. The help screens can be called up at any time from the command prompt. This command can also be accessed from the command prompt by pressing the HELP key.

I: This command is used to insert or delete a complete row or column in the current sheet. Any formulas active on the sheet are not changed, so may need to be changed manually if the insert or delete moves a row or column that is referenced in a formula.

First you will be asked to press 'I' or 'D' depending on whether you wish to insert or delete, next you will be asked to press 'R' or 'C' depending on whether you wish to operate on a row or column. Now you will be asked for either the row or column reference at which to insert or delete. After a short pause the screen will be replaced with the new layout.

J: This command is used to right-justify any text on a specified row

e.g. If you have a sheet showing the expenditure for each month across row AA, you could use this command to make the month names line up with the figures you have entered

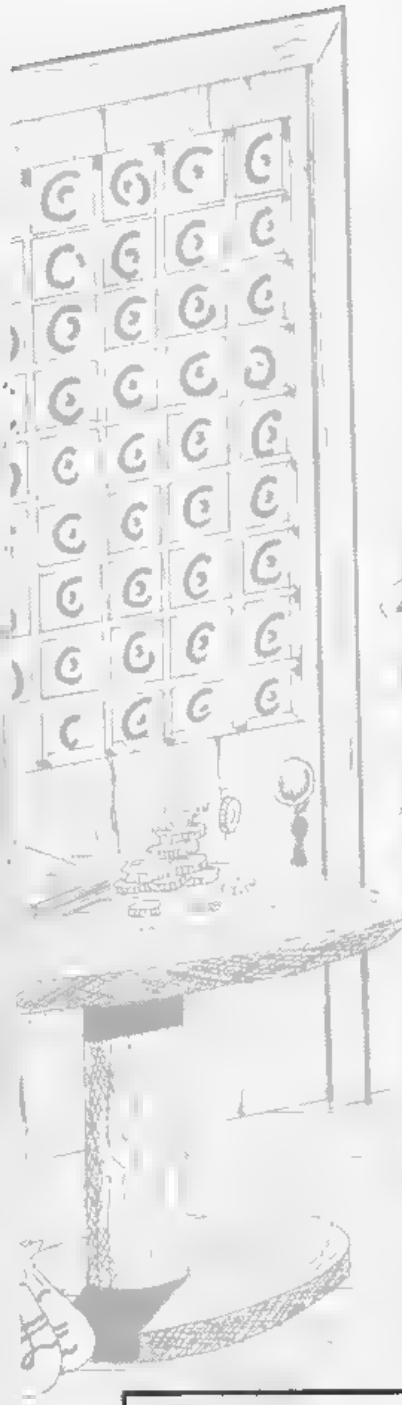
Example 2:

	1	2	3	4	5
AA	JANUARY	FEBRUARY	MARCH	APRIL	MAY
AB	123.45	45.13	28.17	123.65	1423.30

L: This command is used to load a spreadsheet from disk, each example shown in the manual is stored on the main system disk. All spreadsheets are stored in sequential files on the disk, the way data is actually stored is shown in APPENDIX A so that you may read data into any of your own software.

First you will be asked for the name of the spreadsheet you wish to load, sheet names are of a maximum length of 12 characters with a 4 character suffix added by Mini Spread of '.MSD' for Mini Spread Data.

If you already have a spreadsheet loaded and you load a new sheet without first re-starting Mini Spread, the data may be overlaid on top of the original sheet. Please take care



M: This command is used to display the amount of free memory available for data on a spreadsheet. The amount of memory is displayed in bytes under the command prompt Press any key to return to the command prompt. Due to the way memory is used by the Commodore 128 each byte does not represent a single character. If you enter 10 characters of text in a cell, you will actually use 17 bytes. This command will help to show when the sheet is getting full

P: This command is used to print the current sheet, you can either print the whole sheet or part of the sheet. If you only have an 80 column printer you will be limited to 6 columns on a page or, with a 132 column printer, 11 columns per page However, you could always use a utility such as my SIDEWAYS128, a utility to print a spreadsheet sideways on your printer Any width up to 250 characters can be printed in one piece

The sheet may not only be printed out on a printer but may also be sent to a disk file for merging with wordprocessor files, etc.

First you will be asked to press 'P' or 'D' to indicate if you wish to print or send to a disk file If you elect to print to a disk file you will be asked for the name of the file to print to, this may be up to 12 characters long. The suffix '.MSP' is added for Mini Spread Print. Next you will be asked to enter the start row and column and the end row and column to print to. If you wish to start printing at the start of the sheet simply press RETURN when asked for the start row. If you wish to print to the end of the sheet simply press RETURN and the correct row and column will be displayed for you.

To enable Mini Spread to use your printer, set your printer to device number 4.

Q: This command is used to quit Mini Spread, you will be asked to confirm that you wish to quit Press either 'Y' or 'N' – if you press 'N' you will be returned to the command prompt. If you press 'Y' you will be asked if you wish to use Mini Spread again. Again, press either 'Y' or 'N' – if you press 'Y' Mini Spread will be run again, if you press 'N' then the computer will be reset so you can run other software.

R: This command is used to review all the formulas on the sheet, you will have the option to either display or print the list of formulas. If you print them, space is provided for you to write in notes for future reference.

The display for Example 1 should be :-

S: This command is used to save a spreadsheet to disk, all spreadsheets are saved in sequential files. Details of how data is actually stored is shown in APPENDIX A. You will first be asked for the name to save the sheet under. If the sheet was previously loaded from disk its current name is displayed for you, if you wish to use this name simply press Return. All file names may be up to 12 characters long with the 4 character suffix of '.MSD' for Mini Spread Data automatically added.

T: This command is used to enter text into a cell. Text may be up to 11 characters long, all alphanumeric characters are allowed. The cell must be displayed on the current screen to enable you to enter text into it. You will be asked for the row and column to enter the text in. Then you will be asked for the text to enter into the cell

If you press RETURN when asked for the row, you will be returned to the command prompt. If you press RETURN when asked for the text, the current contents of the cell will be overwritten with spaces, so deleting it.

U: This command is used to underline a complete row. The line will extend from column 01 to the highest column previously used. Whenever you enter text, a value or a formula, Mini Spread will check the row and column that was used. When performing certain commands this is used to show the total area to operate on, which makes the operation much faster than trying to, say, calculate the whole sheet if only 50 cells have been used.

You could, of course, underline the row manually by entering a line in each cell in the row, but this command is much faster. The

Example 1A:

Row	Column	Formula
AG	02	TOT AA02-AD02
AG	03	TOT AA03-AD03
AG	04	TOT AA04-AD04
AG	05	TOT AA05-AD05

Spread 128 Mini Spread 128 Mini Spread 1.

line draw is a series of '----------'.

V: This command is used to enter a value into a cell; the cell must be displayed to enter a value into it. A value may be in the range +9999999 98 to -9999999 98. Only numerics, +, - and a decimal point are accepted for entry in a value cell

First you will be asked for the row and column of the cell to place the value in, then you will be asked for the value. If you press Return when asked for the row or the value you will be returned to the command prompt.

W: This command is used to change the area of the sheet displayed on the screen If you wish to move to another part of the sheet you can use this command to move there in one go rather than using the cursor keys; also if you wish to move to cell AA01 this command can be used You will be asked for the row and column to display, if you press Return without entering a row and column the sheet will display from AA01.

=: This command is used to calculate the spreadsheet, if the current spreadsheet is already calculated a tick will be displayed in the top left-hand corner of the spreadsheet. Each cell reference containing a formula will be displayed on the screen, the brief pauses indicate that cells are being checked which do not contain formulas.

Mini Spread calculates in the order : row 1 column 1, row 1 column 2, etc Under certain circumstances a sheet may have to be calculated twice to arrive at the correct values This will only happen if a cell references other cells which also have formulas in them, but only if the other cells are further down the sheet. Let me explain this further with a short example.

Formulas for this example

AA : 02 : (RE02)	: Copy of cell AE02
AE : 02 : TOT AB02-AD02	: Total cells AB02 thru AD02

As you should see, once calculated cell AE02 should contain 5000.00, according to the formula in cell AA02 this should also contain the same value. But if you enter these details and calculate the sheet you will see that cell AA02 contains 0.00. This is not really an error as the value in cell AE02 was 0 when cells AA02 checked it.

If you now recalculate the sheet by pressing = a message will be displayed showing that the sheet has already been calculated (also shown by the tick in the top left-hand corner). If you press = again the sheet will be calculated for you. Pressing any other key will return you to the command prompt.

Once calculation has been started it can be aborted by pressing 'ESCAPE'. A message will be displayed and the command will terminate.

$: This command is used to display the disk directory on the screen. The spreadsheet is removed and the directory displayed. When the directory has been displayed you will be asked to press any key to continue. The sheet will be redisplayed and you will be returned to the command prompt.

```
Example 3.

              1          2          3          4

AA     TOT PROFIT   * FORMULA *

AB     SALES            3000 00

AC     WAGES            1500 00

AD     EXPENSES          500 00

AE     TOTAL        * FORMULA *
```

?: This command is used to search for either text or a value in the current sheet; first you will be asked whether you wish to search for text or a value. Then you will be asked for the entry to find. Every cell reference where the entry is found will be displayed on the screen. After each one you will be asked if you wish to find the next occurence, pressing 'N' will return you to the command prompt.

The text option will not just find text that exactly matches the entry, but also cells which include the entry,

e g Cell AA01 contains 'PROFIT'.
Cell AB01 contains 'PROFIT/LOSS'.
Search for 'PROFIT' - Both cell references above would be displayed.

If you only wanted to find the cells containing 'PROFIT' you should enter 'PROFIT' followed by a space as the text to find.

CONTINUED IN NEXT ISSUE

ON THE DISK

Starburst

Can you face the fury of the alien Sqarn as they seek to overrun the known Galaxy?

By Duncan Kershaw

There are few things more intimidating than a Sqarn mothership at close range. You know what the devilish Sqarn are capable of. Your heart hardens as you think of the devastated Terran colonies strewn across the arms of the Galaxy.

The Sqarn are killers, pure and simple. One and all, their only pleasure is in devising subtle and sophisticated methods of inflicting pain and death.

The obscene bulk of the approaching mothership seems to flicker, and all at once you are in the thick of a furious Sqarn deathfighters. There's no time for fear, no time for hatred either. All that's left is the pure drive for survival..

How to play

There's only one way to win in Starburst – fight your way through the swarms of aliens scrolling down from the top of the screen. Use a joystick in port 2 and may the force be with you!

Loading the program

To load the program outside the menu, enter LOAD "STARBURST",8 and RUN

Escape!

Pit your wits against the might of the Wehrmacht in this action packed escape adventure

By R Martin & W Black

June 1944, somewhere in Bavaria. The midsummer heat blazes down on the assembled air force officers assembled in the courtyard in LuftStalag 13.

In more peaceful times, the feudal castle you inhabit might have been picturesque, but for you it's a prison. Ever since that night over Dusseldorf when Tail-end Charlie bought it in the flak, and there was no-one to spot that Junkers 88 that crept up on your Lanc, you've been incarcerated in a succession of camps. Now, after three failed escape attempts, you are banged up in the supposedly inescapable chateau of Ibzwitz.

Inescapable? No such thing! It's up to you to prove to Jerry that he's taken on more than he can handle.

How to play

Escape is an adventure produced using the Quill, and contains over eighty locations. As you may have guessed, your job is to escape from a German prisoner-of-war camp, using the materials to hand.

As in all Quill adventures, the input required is verb followed by noun. Entering V, for Vocab will give you a list of all verbs used in the game, and HELP may even offer you some help.

Text can be abbreviated to four letters per word. Just to get you going, try EXAMINE BED as a beginning.

Good luck, old boy!

Loading the program

To load ESCAPE outside the menu, enter LOAD "ESCAPE",8,1

ON THE DISK

Score keeper

If you should feel the need to display game scores anywhere on screen, independent of background, this routine may well meet your requirements

By J.B. Kinley

This program is a utility providing a means of displaying game scores (0 to 999999) and number of 'lives' remaining (0 to 6) in a form which is unaffected by screen display mode, scrolling or other animation. This means that scores can be displayed even with the screen in high-resolution mode, without the need for complicated screen-splitting. The routine is easily called from Basic or machine code.

How it Works

The program displays score details by using one of the C64's hardware sprites. The routine contains its own numeric character set which is designed to display six digit scores. There is also a special graphic 'man' character used to represent the number of lives remaining. Using a sprite to hold the date means that it can be shown in any colour, at any location on the screen, and will not be affected by other screen activity. The routine provided uses sprite 0, thus giving the score display priority over all other sprites.

Using the routine from Basic

To use the score display routine from Basic, you must first initialise it (within your program) using SYS 49152. This will set up a starting score of 0 and 0 lives remaining, printing the information, in black, at the top right-hand corner of the screen. Your program must now use Basic variable SC to hold the current score, and LI% for the number of lives. Then call SYS 49218, and magically, your score is displayed. Every subsequent call to SYS 49218 will print the latest values of SC and LI% in this way.

If you need to change the colour of location of the score sprite, do this by POKEing the relevant details into the locations described in your Programmer's Reference Guide - the score is displayed in sprite 0, so look up the locations which deal with its various attributes and adjust them to your requirements.

Location and colour changes are both contained in the demonstration Basic program, so study this if my explanation is still opaque.

Using the Routine from Machine Code

Initialise the routine with a call to INIT at $C000(49152). The values contained in the existing version use sprite 0, reading data in the cassette buffer.

Place your score as ASCII characters from '0' to '9' in the six locations starting from 101 (257). Place your number of lives as a simple numeric value in $C192 (49554). A subroutine call to $C09B (49307) will display the current score and lives remaining.

Loading the program

To load the Basic demo outside the menu enter LOAD "SCORE DEMO", 8 and RUN. To load the machine code enter LOAD "SCORE",8,1.

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We would like to thank you in advance for your time, and remind you that only fully completed questionnaires received by 23rd September will be eligible for the FREE draw.

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1. How long do you keep your copies of Commodore Disk User for:

- Less than one month ☐
- One month ☐
- Three months ☐
- Six months ☐
- A year or more ☐

2. If kept, how often do you refer back to issues of Commodore Disk User?

- Once a week or more ☐
- About once a month ☐
- Once every three months ☐
- Less often ☐
- Never ☐

3. How long do you spend reading your copy of Commodore Disk User?

- Over 2 hours ☐
- 1½-2 hours ☐
- 1-1½ hours ☐
- ½-1 hour ☐
- Less than ½ hour ☐

4. How long have you been a Commodore Disk User reader?

- Less than 3 months ☐
- 3-6 months ☐
- 7-12 months ☐

5. How often do you buy Commodore Disk User?

- Occasional issues ☐
- Most issues ☐
- Every issue ☐

6. How much of Commodore Disk User do you read?

- Read only some articles ☐
- Read most articles ☐
- Read all articles ☐

7. With regard to the advertisements in Commodore Disk User, do you?

- Read or look through most or nearly all of the ads ☐
- Read or look through some of the ads ☐
- Just read or look through the occasional ad ☐
- Very rarely/never look at the ads ☐

8. Does anyone else read your copy of Commodore Disk User?

- No only myself ☐
- One or two other people ☐
- Three or four other people ☐
- More than four other people ☐

9. If your copy of Commodore Disk User is read by other people, please give details of their age and sex:

AGE	PERSON 1	PERSON 2	PERSON 3	PERSON 4
9-14 YRS	☐	☐	☐	☐
15-24 YRS	☐	☐	☐	☐
25-34 YRS	☐	☐	☐	☐
35-44 YRS	☐	☐	☐	☐
45-54 YRS	☐	☐	☐	☐
55-64 YRS	☐	☐	☐	☐
OVER 64 YRS	☐	☐	☐	☐
SEX				
Male	☐	☐	☐	☐
Female	☐	☐	☐	☐

10. Would you like to see more or less coverage given to the following:

	MORE	LESS	SAME
Games Programs	☐	☐	☐
Utility Programs	☐	☐	☐
Programming Features	☐	☐	☐
Utility Reviews	☐	☐	☐
Hardware Reviews	☐	☐	☐
Games Reviews	☐	☐	☐
Book Reviews	☐	☐	☐
Competitions	☐	☐	☐
Educational Programs	☐	☐	☐
News	☐	☐	☐
Interviews	☐	☐	☐

11. Thinking specifically about the advertising content, would you please rate the two main types of advertisement?

	Display	Classified
Very useful	☐	☐
Useful	☐	☐
Quite useful	☐	☐
Not very useful	☐	☐
Not at all useful	☐	☐

12 Which of the following would you most like to see featured with the magazine (please tick only box only)?

- Cover mounted gifts ☐
- Additional supplements ☐
- Competitions ☐
- Money saving offers ☐

13. With respect to the articles/programs in Commodore Disk User, how do you rate the following:

	POOR	AVERAGE	GOOD	EXCELLENT
Games Programs	☐	☐	☐	☐
Utility Programs	☐	☐	☐	☐
Programming Features	☐	☐	☐	☐
Utility Reviews	☐	☐	☐	☐
Hardware Reviews	☐	☐	☐	☐
Games Reviews	☐	☐	☐	☐
Book Reviews	☐	☐	☐	☐
Competitions	☐	☐	☐	☐
Educational Programs	☐	☐	☐	☐
News	☐	☐	☐	☐
Interviews	☐	☐	☐	☐

14. Please give any further comments or criticisms that you feel will help us improve Commodore Disk User.

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15. Which other computer magazines do you read and how often?

	NEVER READ	READ OCCASIONALLY	READ REGULARLY
Your Commodore	☐	☐	☐
Commodore User	☐	☐	☐
ZZAP!	☐	☐	☐
CCI	☐	☐	☐
Amiga User Int	☐	☐	☐
Your Amiga	☐	☐	☐
Amiga Computing	☐	☐	☐
ST/Amiga Format	☐	☐	☐
Computer	☐	☐	☐
Compute's Gazzette	☐	☐	☐
Byte	☐	☐	☐
Other (please state)	☐	☐	☐

.....

16. If read, how do they compare with Commodore Disk User?

	NOT AS GOOD AS C.D.U.	AS GOOD AS C.D.U.	BETTER THAN C.D.U.
Your Commodore	☐	☐	☐
Commodore User	☐	☐	☐
ZZAP!	☐	☐	☐
CCI	☐	☐	☐
Amiga User Int	☐	☐	☐
Your Amiga	☐	☐	☐
Amiga Computing	☐	☐	☐
ST/Amiga Format	☐	☐	☐
Compute!	☐	☐	☐
Compute's Gazzette	☐	☐	☐
Byte	☐	☐	☐
Other (please state)	☐	☐	☐

.....

17. Do you plan to purchase any of the following in the near future?

	YES	MAYBE	NO
New Disk Drive	☐	☐	☐
Utility Software	☐	☐	☐
Games Software	☐	☐	☐
Educational Software	☐	☐	☐
Printer	☐	☐	☐
C64	☐	☐	☐
C128	☐	☐	☐
Amiga	☐	☐	☐
Computer Books	☐	☐	☐
Commodore Disk User	☐	☐	☐

18. Do you attend computer exhibitions/shows? If so, please state which ones.

.....

.....

.....

19. Does computing or a related activity provide you with an income?

YES ☐ NO ☐

20. Are you a member of a computer club/association? If so, which one(s)?

.....

.....

.....

21. How much do you estimate having spent on computer equipment during the last 12 months?

Nothing	☐
Up to £100	☐
£101-£200	☐
£201-£300	☐
£301-£500	☐
£501-£750	☐
£751-£1000	☐
Over £1000	☐

22. Which computer do you own?

C64	☐
C128	☐
Plus/4	☐
C16	☐
Amiga	☐

23. Do you have a speed device fitted, (e.g. Dolphin Dos)?

YES ☐ NO ☐

24. Do you own any cartridges for your computer?

YES ☐ NO ☐

25. Do you own a printer?

YES ☐ NO ☐

26. If you own a printer, which one?

Commodore	☐
Epson compatible	☐
Other (please specify)	☐

.....

27. Are you aware of the scheduled publication day?

YES ☐ NO ☐

28. If the answer to the previous question is YES, do you attempt to purchase the magazine on that day?

YES ☐ NO ☐

29. How do you normally obtain your copy?

Chance purchase	☐
Newsagent shop collection	☐
Newsagent home delivery	☐
Subscription	☐
Passed on copy	☐

30. If you are a subscriber, on which date did you receive this issue?

☐☐ / ☐☐ / ☐☐

31. If you do not obtain your copy by subscription, is it due to one of the following:

Subscription too expensive	☐
Not every issue required	☐
Not aware subscription Service available	☐

32. Are you aware that to subscribe to this magazine in the U.K. is the same cost as purchasing it in a shop?

YES ☐ NO ☐

33. Would you like to receive further details on taking a subscription?

YES ☐ NO ☐

34. If you do not subscribe, from which type of newsagent do you most often obtain your copy?

High Street shop	☐
Estate shop	☐
Corner shop	☐
Travel point	☐
Other (please specify)	☐

.....

35. If you have subscribed to this magazine but now lapsed, is it due to:

Subscription too expensive	☐
Every issue no longer required	☐
Lateness in receiving subscription copy	☐
Poor service from our subscription bureau	☐

36. What is your marital status?

- Married ☐
- Single ☐
- Divorced ☐

37. Age (please tick)

- Under 15 YRS ☐
- 15-16 YRS ☐
- 19-21 YRS ☐
- 22-24 YRS ☐
- 25-34 YRS ☐
- 35-44 YRS ☐
- 45-54 YRS ☐
- 55-64 YRS ☐
- Over 64 YRS ☐

38. Sex:

Male ☐ Female ☐

39. Are you...?

- In full-time employment ☐
- In part-time employment ☐
- Not employed at present ☐
- Retired ☐
- Student - full-time ☐
- Student - part-time ☐

40. If in full-time employment, please state your occupation

. . . . . .

41. If student, what subjects studied?

. . . . . .

. . . . . .

. . . . . .

42. Please tick the box which represents the annual total of your gross income:

- Under £6,500 ☐
- £6,501-£8 000 ☐
- £8,001-£10 000 ☐
- £10,001-£12 500 ☐
- £12,501-£15,000 ☐
- £15,001-£19 000 ☐
- £19,001-£25,000 ☐
- Over £25,000 ☐

43. Which of the following do you have?

- Bank current account ☐
- Bank deposit or savings account ☐
- Life assurance policy ☐
- Any stocks or shares ☐
- Access card ☐
- Barclaycard (Visa) ☐
- American Express ☐
- Diners Club ☐
- Unit Trusts ☐
- Private medical ins ☐
- Personal Accountant ☐
- Building Society account ☐
- A mortgage ☐
- Any. H P agreements ☐
- Telephone ☐

44. Do you have any of the following cards either yourself or jointly with another person?

- Cash dispenser card ☐
- Retailer card/store card ☐

45. How many cars are there in your household?

- None ☐
- One ☐
- Two ☐
- Three or more ☐

46. What cars do you own?

. . . . . .

. . . . . .

. . . . . .

. . . . . .

. . . . . .

47. Is one or more of your cars a company vehicle?

YES ☐ NO ☐

48. Do you usually buy your cars new?

YES ☐ NO ☐

49. How often do you tend to change your car(s)?

- Once a year or more often ☐
- About every two years ☐
- About every three years ☐
- Less often ☐

50. Do you own a:

- Stereo/Hi-Fi system ☐
- Tape player/recorder ☐
- Video recorder ☐
- T V ☐
- None of the above ☐

51. Do you own your own home, rent or live with your parents?

- Own ☐
- Rent ☐
- Live with parents ☐
- Other (please specify) ☐

. . . . . .

52. If you own your own home, what is the approximate value (your principal residence if you have more than one)?

- Under £50,000 ☐
- £50,000-£74,999 ☐
- £75 000-£99,999 ☐
- £100,000-£149,999 ☐
- £150,000-£200,000 ☐
- Over £200 000 ☐

53. How many rooms does your home (or principal residence) have?

	1	2	3	4	5	6
Bedrooms	☐	☐	☐	☐	☐	☐
Reception rooms	☐	☐	☐	☐	☐	☐

54. If you have children, please indicate their age and sex (give details of the four youngest if you have more than four).

AGE	FIRST	SECOND	THIRD	FOURTH
1-3 YRS	☐	☐	☐	☐
4-8 YRS	☐	☐	☐	☐
9-12 YRS	☐	☐	☐	☐
13-16 YRS	☐	☐	☐	☐
Over 16 YRS	☐	☐	☐	☐
SEX				
Male	☐	☐	☐	☐
Female	☐	☐	☐	☐

55. How many of the following items do you buy, on average, over a month?

	LESS THAN 1	1 or 2	3 or 4	5 or 6	MORE	NEVER BUY
A book	☐	☐	☐	☐	☐	☐
A record	☐	☐	☐	☐	☐	☐
A tape	☐	☐	☐	☐	☐	☐

56. Please indicate below when you last did any of the following:

	IN LAST WEEK	IN LAST MONTH	LONGER AGO
Ate out at a restaurant	☐	☐	☐
Entertained at home	☐	☐	☐
Went to the theatre/ opera ballet	☐	☐	☐
Went to a music concert	☐	☐	☐
Went to the cinema	☐	☐	☐
Attended a sporting event	☐	☐	☐
Visited an art gallery/ museum	☐	☐	☐
Went to a pub	☐	☐	☐
Had a short break in a hotel	☐	☐	☐

Overseas holiday (in last 12 months) YES ☐ NO ☐

57. Which of the following do you drink?

	MORE THAN ONCE A WEEK	ONCE A WEEK	LESS OFTEN
Beer	☐	☐	☐
Lager	☐	☐	☐
Wine	☐	☐	☐
Sherry	☐	☐	☐
Port	☐	☐	☐
Brandy	☐	☐	☐
Gin	☐	☐	☐
Rum	☐	☐	☐
Vodka	☐	☐	☐
Whisky	☐	☐	☐
Liqueurs	☐	☐	☐

Don't drink ☐

58. Where do you buy most of your drink from?

- An off-licence ☐
- A supermarket ☐
- A Public House ☐
- Other (please specify) ☐

. . . . . .

59. Are you a member of a book club?

YES ☐ NO ☐

60. Are you a member of a record club?

YES ☐ NO ☐

61. Other then items purchesed for your computer, have you bought any other types of goods by mail-order during the past 12 months?

YES ☐ NO ☐

62. If the enswer to the previous question is YES, please stete the type(s) of goods purchesed.

.....

.....

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63. Do you smoke?

Cigerettes	☐
Cigars	☐
Pipe	☐
Don't smoke	☐

64. Neme the three television progremmes you wetch most regularly

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.....

.....

65. Do you listen to commerciel radio stetions?

YES ☐ NO ☐

66. Which of the following newspapers do you reed?

The Times	☐
The Deily Telegraph	☐
The Finenciel Times	☐
The Guerdian	☐
The Independent	☐
The Delly Express	☐
The Dsily Mail	☐
The Daily Mirror	☐
The Sun	☐
Todey	☐
None of the ebove	☐

67. Which of the following Sundey newspepers do you reed?

The Sundey Times	☐
The Observer	☐
The Sundey Telegraph	☐
The Sundey Express	☐
The Mail on Sundey	☐
The Sundey Mirror	☐
The People	☐
The News of the World	☐
News on Sundey	☐
None of the above	☐

68. Which, if eny, of these sports end activities do you play or teke pert in nowedeys?

Cricket	☐
Fishing	☐
Golf	☐
Rugby	☐
Soccer	☐
Seiling	☐
Skiing	☐
Shooting	☐
Swimming	☐
Squesh	☐
Tennis	☐
Weight training	☐
Windsurfing	☐

69. Which of the stores listed below heve you been shopping in during the last six months?

Boots	☐
W H Smith	☐
John Menzies	☐
Dixons	☐
Currys	☐
Leskys	☐
Rumbelows	☐
Burtons	☐
Austin Reed	☐
Hornes	☐
Next	☐
Fosters	☐

To enter our FREE draw, fill in your name and address details and fold as shown below. Remember all entries must be returned by 23rd September 1988.

NAME. .....

ADDRESS .....

.....

COUNTY .....POSTCODE .....

To post, fold on the dotted line A. Fold egein et B end C and tuck B into the flep formed by C.

A

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Do not affix Postage Stamps if posted in Gt Britain, channel Islands N Ireland or the Isle of Man

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No. 1 Golden Square,
LONDON
W1R 3AB

C

B

Location Finder

ON THE DISK

It gets pretty boring looking through object code to find out just which page zero locations it's messing up. Take the legwork out of it with this short simple program.

By Gordon Davis

Location Finder quite simply tells you which memory locations a piece of object code is using, including those all-important page-zero addresses. The information can be vital if you want to incorporate a piece of object code into your own programs.

The program resides at $C000(49152) and can be called by SYS49152, although, like the machine-code relocator featured elsewhere in this issue, it is better used in conjunction with a monitor.

Location Finder asks you for a start and end address for the code you want scanned, and then displays a list, on screen, of the addresses referenced. The first screen shows page-zero references, and following screens the rest. Pressing any key will get you the next screen.

Each memory reference is displayed in hex, and is followed by a qualifier showing the type of reference. This can consist of up to six characters, as follows:

R: Location is read
W: Location is written to
A: Absolute index location - read
B: Absolute index location - write
X: Indirect index location - read
Y: Indirect index location - write

Naturally, the last two will only appear for page-zero locations. If you need to use this program, you will understand what I mean by Absolute and Indirect indexing, but just for general interest, I'll explain briefly.

In both cases, the location itself is not (necessarily) read or written, but is used as an index to point to the correct location.

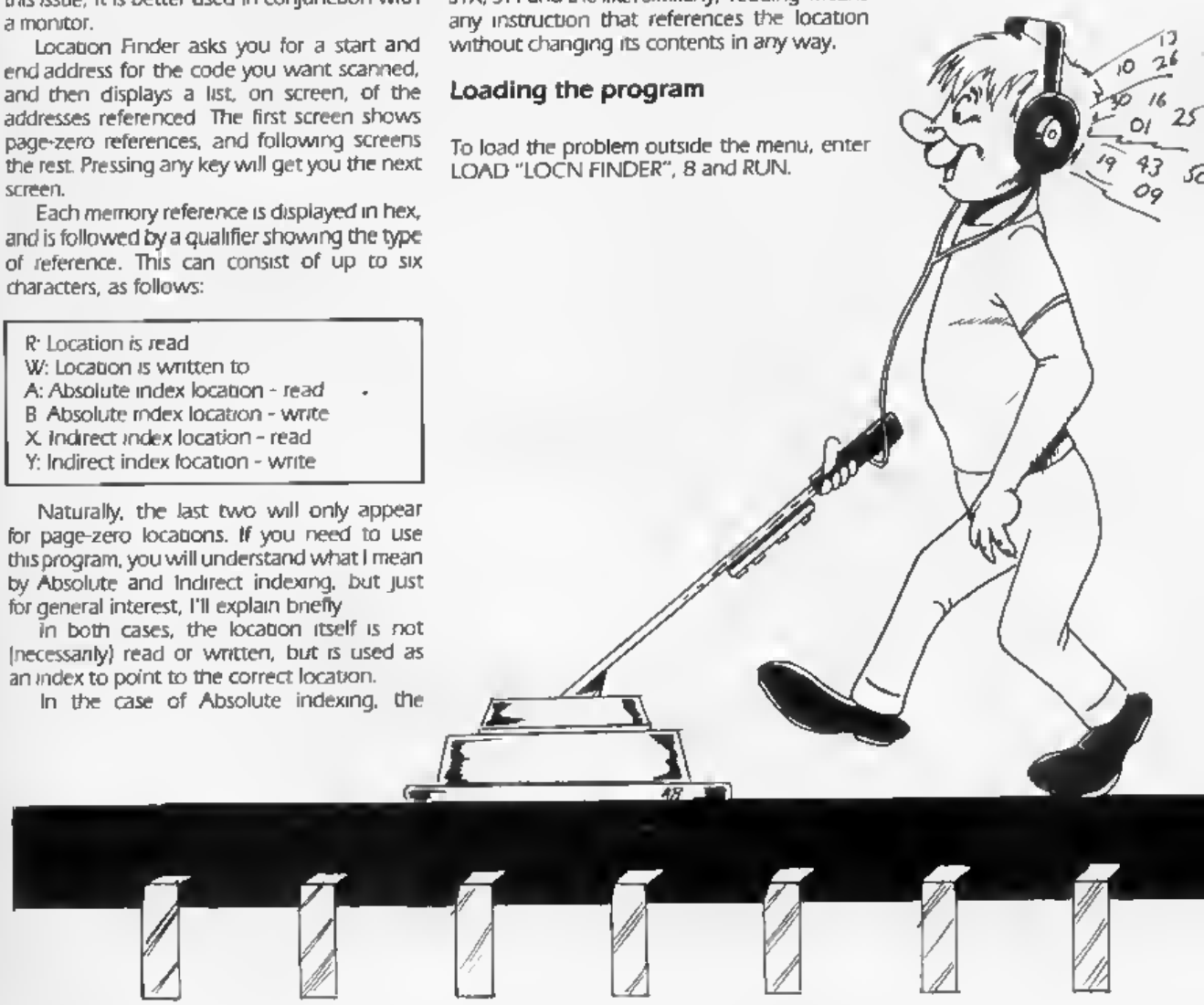
In the case of Absolute indexing, the address of the location is added to either the contents of the X or the Y registers to give the actual address. Of course, if the register contents were zero, then the location itself would be referenced. Any location can be used as an absolute address.

Indirect indexing can only use a pair of page zero locations as an index reference.

Finally, 'writing' refers to any operation that affects memory contents, not just STA, STX, STY and the like. Similarly, 'reading' means any instruction that references the location without changing its contents in any way.

Loading the program

To load the problem outside the menu, enter LOAD "LOCN FINDER", 8 and RUN.

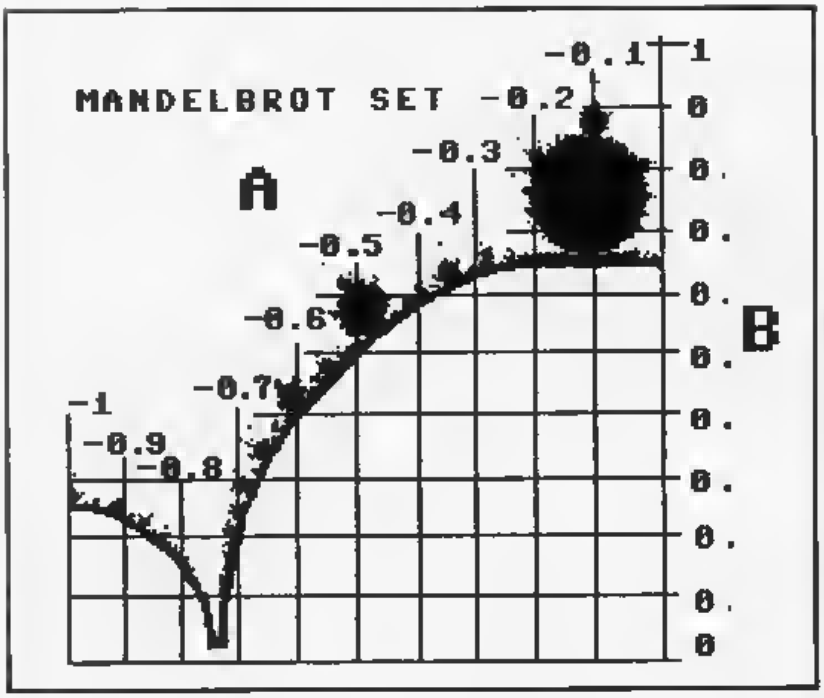


ON THE DISK

Fractal Frolics

Fractals are usually treated as obscure things which you can only investigate using a Cray II supercomputer. But now you can do them using a humble C64...

By D.G. Wilkinson



The strange patterns which illustrate this article are known as 'fractals' because of their fractured appearance. The name fractal was coined by Benoit Mandelbrot who is the father of this exciting new branch of mathematics. No matter how closely one zooms in on a fractal it reveals further intricacies.

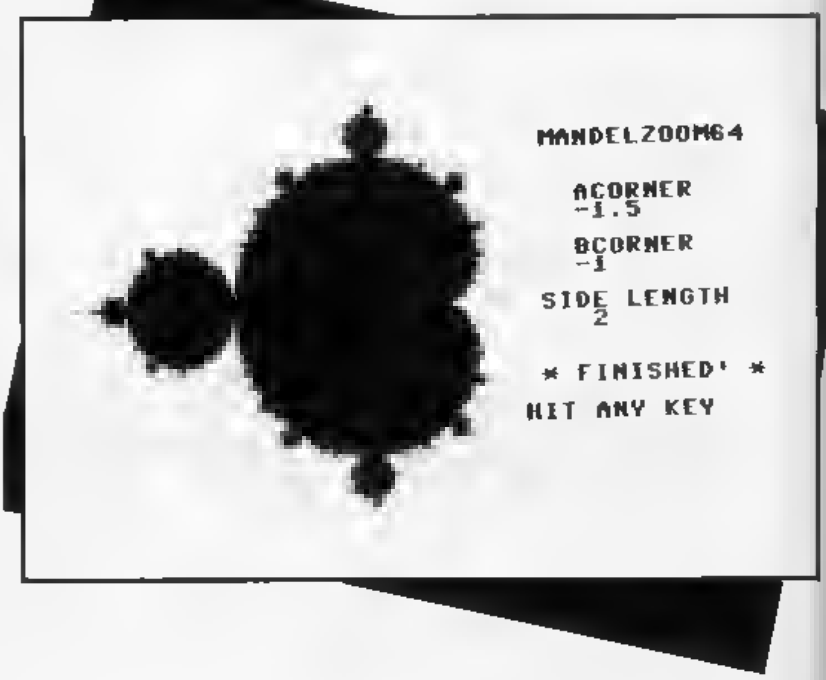
The program which accompanies this article gives Commodore 64 owners the chance to explore a landscape which is usually the province of much more powerful computers. Because of the millions of computations necessary to plot pictures of this strange object, the manufacturers of powerful graphics engines often use it to demonstrate the speed of their latest computer. Pity then, the poor old Commodore 64, with its creeking BASIC 2.0 and lack of a proper graphics language. I first tried to plot the Mandelbrot set using machine code to do the plotting and Basic to perform the calculations. After 12 hours computing time, only a quarter of the screen had been plotted!

To cut a long story short – literally – the program which accompanies this article uses machine language for both the calculations and the graphics. It still takes some time to run, in spite of being carefully optimised for speed, but it is useable and can reveal some of the most intricate details as the illustrations show.

The Mandelbrot Set?

Although the set is in the province of complex numbers, the actual calculations are quite straightforward. The following simple Basic program gives the algorithm used.

```
10 A=-1.5:REM ACORNER
20 B=-1  :REM BCORNER
30 S= 2    :REM SIDE LENGTH
40 D=S/200  REM D = INCREMENT
50 FOR I=1 TO 320:REM MOVE ACROSS THE
SCREEN
60 B1=B
70 A1=A1+D  REM INCREMENT A VALUE
80 FOR J=1 TO 200:REM MOVE UP THE
SCREEN
90 B1=B1+D :REM INCREMENT B VALUE
100 X1=0 :REM START EACH LOOP WITH
110 Y1=0 :REM       ZERO VALUES
120 N=0 :REM N IS THE LOOP COUNTER
130 REM THIS IS THE CALCULATION LOOP
FOR EACH SCREEN POINT
```



```
140 X2=X1*X1 : REM CALCULATE X SQUARED
150 Y2=Y1*Y1 : REM CALCULATE Y SQUARED
160 IF X2+Y2=4 GOTO 210:REM IF THIS TEST
FAILS - DON'T PLOT THE PIXEL
170 Y1=2*X1*Y1+B1 : REM CALCULATE NEW
Y
180 X1=+2-Y2+A1 : REM CALCULATE NEW X
190 IF N101 THEN 140
200 REM PLOT POINT I,J ONLY AFTER 100
LOOPS
210 NEXT J
220 NEXT I
230 END
```

As you can see from this program, up to 100 iterations are necessary for each point on the screen. This means that there can be up to 6.4 million calculation loops for a full C64 high resolution screen!

The basic algorithm for the program used here was devised by A.K. Dewdney and described by him in the November 1987 issue of Scientific American. This algorithm avoids the use of square roots and allows the plot to zoom in on any area of the set, hence the name of the program given here – MANDELZOOM64.

As a matter of interest, the same algorithm has been coded by the writer for the Amstrad 1640 equipped with an 8087 number crunching chip. Even this machine takes over an hour for a full plot of the screen.

The program

The control program is written in BASIC and is menu driven. It gives you the choice of two resolutions – 200 X 200 points or 50 X 50 points. The smaller plot takes about half an hour and the larger one takes between eight and nine hours. You can pick any area to plot, although the only interesting sections are along the borders of figure 1, which shows the complete Mandelbrot set. MANDELZOOM64 also allows Hi-Res to be switched on, colours to be set for the high resolution screen, and patterns to be saved or loaded from disk or tape. If you have a Canon or Epson-Compatible printer you can also make prints from the screen using my MULTIDUMP program.

The control program is set up to autoload the machine language program and MULTIDUMP if you are using it. If either of these are already in memory they will not be reloaded, so you can stop and restart the program as you wish. To use the program just hit the required menu number and follow the instructions.

For the best results the side length needs to be small – less than 0.003. Use the grid in figure 2 to estimate the initial values of ACORNER and BCORNER. A suggested procedure is to pick a likely area to investigate and use a side length of about 0.2. Plot this at a resolution of 50 X 50 points and if this shows up an interesting area zoom in on this, again using a 50 X 50 resolution. Finally plot a tiny area at 200 X 200 resolution – I start mine going in the morning before going to work and check it the evening if there hasn't been a power cut!

When you are plotting a picture the RUN/STOP key will not stop the program. However the combination of RUN/STOP with RESTORE does the trick.

A number of patterns are included on the disk. These have the parameters:

Fig.	ACORNER	BCORNER	SIDE LENGTH
1	-1.5	-1	2
2	-1	0	1
3	-0.73	0.245	0.005
4	-0.7298	0.2477	0.0025
5	-0.78	0.12	0.01
6	-0.7765	0.1225	0.003
7	-0.7799	0.1222	0.0015

Just to give you another reference point, the centre of the bottom of the groove in Figure 2 is at about AC=-.752 and BC=.032, so you could start from there and have a look at the sides of the grooves. If you have an adventurous nature, you can try varying the iteration constant from the 100 to which it is set. Just add a line to the BASIC program:

382 POKE 5121,n

where n= your new value.

If you reduce this it will speed the program up, but the patterns will not be as interesting.

Another possibility is to change the iterate value, set to 4 in the program. This requires the following line added.

384 SYS 5117,e

Where e= your new value.

I am not sure what the outcome of changing this will be – I have never tried it!

I have no space here to go into the useful applications of fractals and the Mandelbrot set, but I hope my article and program may have stirred your interest.

Which Assembler?

Most people who program the 64 seriously use assemblers. What are they and where do you get one?

By Gordon Davis

If you're a regular CDU reader, you may well be a regular assembler user. On the other hand, you may have noticed us referring blithely to assembler programming, and have wondered what this magical technique is, and where you can get an assembler yourself.

An assembler performs a process of translation. As all accounts of computers insist on repeating *ad nauseam*, machines only 'understand' instructions when these are coded in binary. This binary form is known as machine language, or machine code, and is just about unreadable to humans.

An assembler is a very necessary tool for producing machine code. It allows you to set up the code in a more human-comprehensible form, known as assembly language, and does all the translating itself.

Bells and whistles

All of which doesn't mean that hacking assembly language is an easy process in itself. In comparison with Basic, it can be horrendously difficult, and how horrendous it is may well depend on the quality of the assembler which you use.

Assemblers tend to have a variety of features designed to help you to produce code rapidly and accurately. Some of these bells and whistles are in fact absolutely necessary, others are real additions for which one should feel positively grateful.

An example of the absolutely necessary is symbolic assembly. Software houses often proudly proclaim that their products are two-pass symbolic assemblers. Sounds great, but they're really saying that the software does the absolute minimum in order to be usable.

The use of symbols for a start allows you to direct a 6502 branch instruction to a label which represents a memory location (much as you'd use a GOTO in Basic). The assembler will calculate the value of the label itself. If you had to keep recalculating the values needed in branch instructions yourself, you'd have no time to do anything useful.

Symbols are also used for a variety of tasks, including setting up constants so that you can refer to them by name. Any non-symbolic assembler is a teaching aid, nothing more.

By the way, two-pass means that the assembler software has to make two scans through the program you have written ('source code') to produce machine code. If the assembler is symbolic, then it will usually be necessary to make two passes, so 'two-pass symbolic' is rather a redundant term.

Pseudo-op codes

An assembler op code is a sequence, usually of three letters, that corresponds to a single 6502 instruction, e.g. LDA. Assemblers also offer a range of other sequences, known as pseudo-op codes, which do not produce a machine code instruction at assemble time, but are in fact assembler directives – they define the position of code in memory (ORG), set constants to a value (EQU) or set up data areas (this one varies a lot).

All assemblers will have ORG, EQU, or the equivalent, but they vary a lot in the range and power of the other directives. As an example, Supersoft's Mikro assembler has only three of the data operands, WOR, BYT, and TXT which allow you to specify data as two-byte words, single bytes or strings respectively. Zeus64, by the now-defunct Crystal Software, has seven such instructions. Both assemblers, incidentally, have their virtues.

Monitors

A few issues back, we discussed the use of machine-code monitors. These are an absolute must for machine-code programming, as they allow you a series of more-or-less sophisticated ways of debugging your programs once assembled. Broadly speaking, you shouldn't have to buy a separate monitor, most assemblers come with one built in so it's a feature to be noted by its absence.

It's worth noting that monitor/debuggers vary considerably in their sophistication. From the basic, such as Psymon, a little monitor we featured on our disk a few issues back, one can reach the dizzy heights of the Laser Genius Analyser, a piece of software that is itself programmable in a subset of Forth!

This latter assembler is one of the few on the C64 to feature macro and conditional assembly. Macro assembly means in effect setting up a chunk of source code as a single key-word which can then be placed elsewhere in the text. It saves you having to type out the same thing twice.

Conditional assembly allows you to put a series of switches in the source code, so that you can very simply control which chunks of code are assembled, including macro definitions.

Going shopping

So, what's out there for you to buy? Well, I have to say that the C64 assembler market is a peculiar one. A very large number of assemblers have been produced for the machine, but very few of them are on general release. This is due to either companies folding, or not supporting the product. The profit margin on systems software is notoriously low.

Dealing with currently available products, these include: the aforementioned Mikro, from Supersoft, YER6502ASM, from York Electronic Research; Merlin's C64 Assembler; and Speedy Assembler from *Your Commodore*, CDU's sister magazine.

Of these, you may find the Merlin assembler in the shops, but I can't comment on it here because the company doesn't have it on general release in the UK, and couldn't supply us with a copy. Merlin does sell a well-regarded C128 assembler.

Supersoft's Mikro is a very worthwhile package for the first-time machine-coder. It's one of the few assemblers I've seen in cartridge form, and as a consequence retails at an intimidatingly high price. Although it's simple enough not to confuse the beginner, it does come complete with monitor.

YER's offering, on the other hand, is very much more spartan. There is no monitor, and the pseudo-ops and utilities are at the absolute minimum. On the other hand, YER doesn't want an arm and a leg for this disk-based package.

I don't wish to say an awful lot about the *Your Commodore* product, lest I be accused of nepotism. It is however a true commercial assembler resembling Zeus64, in many ways (see below) with the ingenious addition of a second symbol table to act as a global reference.

Sic Transit

That isn't the end of the story. The products I've mentioned above are available on mail order, but if you have a poke around software shops you may well find some of the older products still in stock. I discovered a pile of Zeus64 disks in a shop some six years after Crystal vanished, for example.

Newness is not necessarily a virtue in system software, and so at least three of these products deserve honourable mentions.

The Commodore Macro Assembler, goes right back to the start of the C64, and is still a perfectly usable assembler for the first-time coder. It's astonishing how many CDU readers are in fact using this system.

Products listed

Mikro Assembler, Supersoft, Winchester House, Canning Rd, Wealdstone, Harrow. Tel 01-861 1166. Price: £57.70

YER Assembler, York Electronic Research, Dept YC, 4 Fishergate, York YO1 4AB. Price: £12.99

YC Speedy Assembler, YC Readers Services, ASP Ltd, 9 Hall Rd, Hemel Hampstead, Herts. Price: £6.00.

Zeus64, Commodore Macro Assembler, Laser Genius. Some retailers, price on request

I have a soft spot for Zeus64, since this is the package I've used most often. Of all the assemblers, this has the clearest documentation, in the form of a convenient little A6 pamphlet. It's perhaps the only package I've seen that bridges the gap between beginnerdom and professional programmers.

In spite of this, there are some major flaws. The worst one from my point of view, is that Zeus64 source files are limited by the memory available, whereas most other assemblers, even some very simple ones, will allow you to link in extra source modules from disk. This is annoying, and can be very inconvenient when you're writing very large packages.

Last word

Sentiment apart, though, I'm afraid I'm considering converting to Laser Genius, the only C64 assembler I've seen that is really up to commercial data processing standards. This one's got it all: macro assembly; conditional assembly; monitor; debugger; and that ingenious Forth-based analyser I mentioned. The manual is terse, but still runs, with index, to 69 pages. Pseudo-opcodes include everything I can think of, and then more.

Laser Genius was, until recently, being marketed by Oasis Software, but has now lost that support, so I'm afraid you'll have to get hold of it where you can.

So we've reached a saddening conclusion. Although the assemblers available are for the most part excellent products, they suffer from a common simplicity. If you want more power, it's just not available unless you're lucky.

Over to you

Perhaps you have views of your own on this situation. I'd be interested, among other things, to know which assemblers CDU readers use, and what your feelings are about them (you may well be feeling annoyed because I haven't mentioned yours). The first five replies opened, abusive or not, will get ten free disks each.

Bulletin Boards

Bulletin boards don't just give you something to hack into You can set them up yourself – very cheaply, Mary Branscombe spells out the basics

Bulletin Boards have a lot to offer the Commodore owner, but what are they? How do you use them? And where can you get them?

Over the past few years, computer communications has really come to the fore. nearly all computers come with a serial or an RS232 port on the back of the circuit board; nearly all computers have some form of communications software or another, and nearly all computers are capable of talking to each other.

So what is all the fuss over communications? Why is there an almost fanatic need for computers to be linked up to each other, and once you have this capability, why do people (myself included) whack up horrendous telephone charges simply getting on-line?

Ever since the dawn of time, man has needed to communicate with his own kind, sophisticated communications systems have been developed that enable man to transmit information by making a series of noises with his mouth (I know this sounds stupid, but read on – there is a point to it all!).

With the computer, man has found the need to exchange information and data, and by making the computers create noises over the telephone line it is quite easy to restructure that noise back into information

The process is called Modulation/Demodulation, and the first three letters of each process have been combined to make the acronym MODEM– the device that is used to connect computers to each other over the telephone line.

Over the past few years, specialised information services have been set up to collect and share information, these services – originally set up for businesses such as accountants and bankers have already been well and truly established. These services were normally running at very slow speeds to begin with, they ran on specialised equipment, and a great many companies from accountants to banks used these systems in order to access a great deal of information quickly, but those days are past, and nearly everyone has access to a computer, and therefore possible access to an online system.

For the home computer buffs the equivalent of an online system is called a bulletin board.

Have you ever seen at college or at work such things as a bulletin board? Perhaps your local newsagent has one set up in the window of their shop (have a look when ordering your next issue of CDU!) well, the equivalent is there for computer users all over the country.

Hackers are remarkably solitary creatures, only mixing with their own kind – where possible, and to this end, the bulletin board is the ideal place

A bulletin board is essentially just that, a series of messages on a computer systemb broken down into SIGs (special interest groups) for easy access – all you have to do is ring up the system and access (normally via series of menus) the SIG that interests you

Don't think that you have to ring up a Commodore-based bulletin board in order to find useful information - true, most of the best and most pertinent stuff is up there on Commodore bulletin boards, but many of the best bulletin boards are running on Tandy TRS 80's – one of the first home micros!

Which leads me to my next subject, software compatibility.

A number of very good Bulletin Boards such as Project or Chronos' Lair do not use Commdore 64s, but there are still programs up and waiting to be downloaded which run on the C64 – likewise they do not run on an Atari ST, but there are loads of ST routines as are there BBC B, Archimedes and Amiga files too!

How does a BB work?

A Bulletin Board is normally based around a hard disk, a modem, and a spare telephone line – very few sysops (operators for the Bulletin Board) use their own telephone numbers, as hackers sometimes ring at inopportune times, or when the telephone is being used by someone's Mum and Dad!

The Bulletin Board is normally based

around a software package which, suprisingly enough, can be obtained as public domain or as shareware for about $40 in the states - called "Wildcat!", this package can be used to set up a series of disk based menus from which the caller can direct using a simple series of menus

Wildcat is available on a number of machines and it is designed to act as a scrolling bulletin board – ie, the text starts at the top of the screen and scrolls off – a lot like listing a program

You will need an 80 column mode on your C64 in order to access the full potential of the system otherwise the menus will look a little (ahem!) scrambled to say the least.

What is Prestel?

In the late seventies, a service was set up in England called Prestel – essentially based around a very sophisticated terminal with special graphics symbols and a numeric keypad (not a qwerty keyboard), this system set out to offer up to the minute news and information on a global scale.

The result has been something far more interesting!

Some ten years later and Prestel has spawned a whole communications subculture, the system is dated, the information still very general, the graphics are quite barbaric by today's standards, but still the service offers plenty of information to the computer user as well as the general public

Competing services are cropping up all the time – I mentioned Compunet a while ago, and this is essentially the same system for the Commodore 64 and the Amiga, but without the access to Prestel pages.

Compunet is probably one of the biggest Commodore – only services, although you need special software the membership fee also includes a modem thrown into the deal as well – which can't be bad can it?

Setting up your own BB system

DO NOT BUY A PACKAGE TO BEGIN WITH! This may seem like a strange thing to say, but scour the Bulletin Boards for a suitable public domain package that suits your requirements. First of all decide what sort of service you want to offer. Do you want an interactive system (that takes lots of money and hardware) or do you just want a service by which people can ring up your number, access a few menus, get their info and log off.

Arrange with a PD library for them to upload a new set of software every month for your chosen machine – if this means accepting unsolicited packages then be very careful – a number of packages I have downloaded have been professional and commercial software titles with their names changed and their screens altered so that they look as if they are Public Domain – you, as a sysop can be prosecuted for running pirate software and that's bad news.

Always behave properly when scouring the bulletin boards for your bulletin board software. Don't just log on, leave a few messages, page the sysop and just put the phone down. Behaving like that will not get you any friends at all! Simply look at the message section on the system – scan a few pertinent ones (the ones that are secret are hidden from you do don't think you are reading anyone's mail) first of all scan the ones marked for the attention of "ALL" or something similar, and just follow your nose, this is what comms is really about.

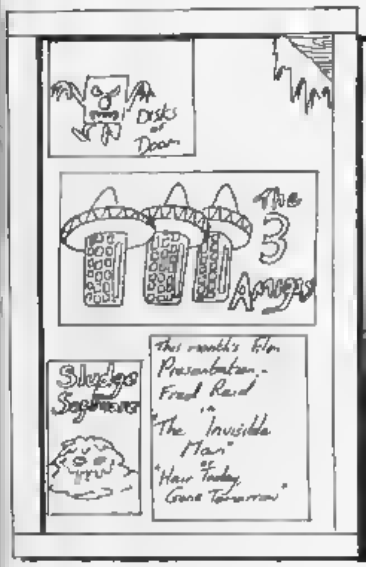
Behaving on a bulletin board is very important because it is very easy for people to bring the system down, and only a bunch of nerds would destroy data or hog the system by simply putting the phone down when they get bored with the service. If you take the phone or the computer offline before you have gone to the logoff page it can take the computer as long as five minutes to recognise this fact – close/open files, compact the disc and ensure that no data was lost

Sometimes this can only be done with the sysop at the main console, and if you rung up a system at, say, 3.00am (cheapest time to ring) the computer will page the sysop when something nasty haopens at that time in the morning you will not be friendly!

So, behaving is very important when on a system, other than that you are free to wander wherever the system will let you, and that can open up new vistas of enjoyment for you and computer

On The Disc...

On the disc I have supplied a few numbers from my own collection of bulletin boards and services – due to the the ever changing state of the bulletin board world, I cannot be sure that all of these numbers are still operational, so have a listen in when dialling for the first time, as people do move home, and some poor person may not want to be woken up at three in the morning t the sound of 1200Hz carrier screeching down at them! Just load the file BBLIST and foll signs.



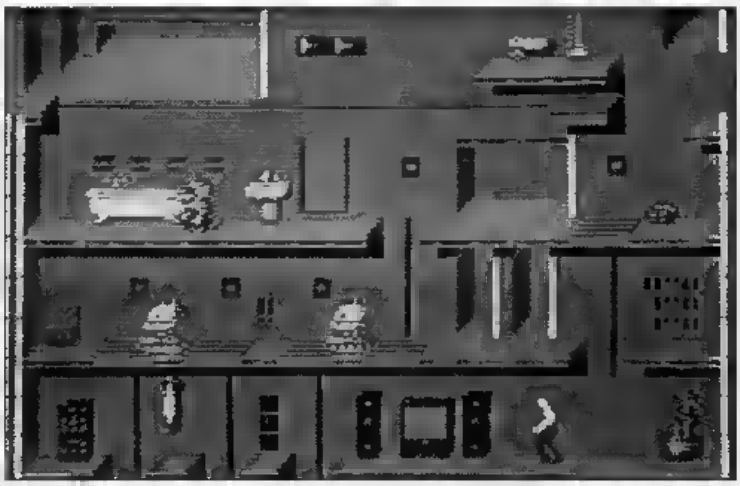
PROFILE

US Gold

US Gold were possibly the first US software house to fly Old Glory over the UK market. Tony Hetherington salutes the flag

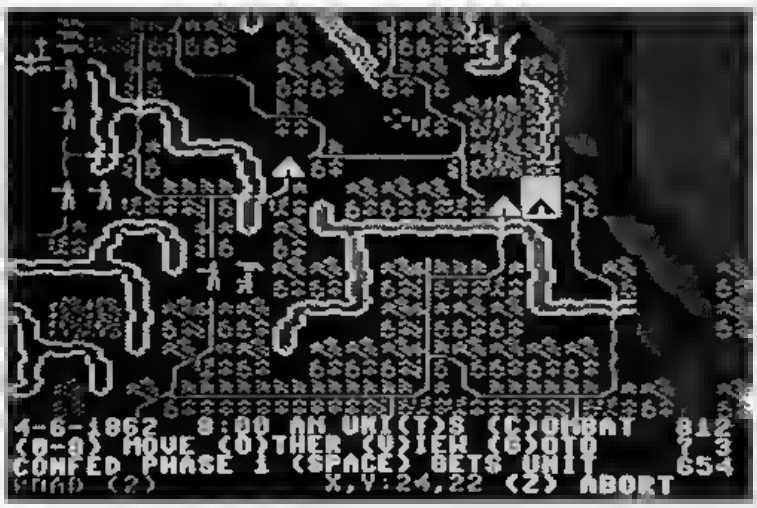
US Gold has dominated the market since it began importing American software back in 1983 with a string of classic games including Winter Games, Gauntlet, Beach-Head, Leader Board, Silent Service, Hardball, Ultima III, Dambusters and Dropzone. Unfortunately, some of the licensing deals are now over as Microprose has set up a UK office of its own taking Origin Systems and Cosmi with it and Accolade has moved to Electronic Arts.

However, a brief look at the current US Gold line up of games shows that there is plenty of software where those hits came from and there's a lot more on the way. In the next few pages we'll take a look at the latest releases from US Gold, Epyx, SSI, Capcom and GO! plus the latest update on the Dungeons and Dragons games.



Epyx

The excellent range of Epyx games was featured recently in CDU but has recently been expanded by the release of Impossible Mission II. According to Epyx this was one of the most requested games and they were swamped with enquiries about when it would be released before they had even planned it. The



sequel actually took four years to appear and was well worth the wait.

Once again you must foil Elvis Atombender's insane plans to destroy the world by infiltrating his multitower complex, running the gauntlet of his security droids to find the pieces of the musical code that will disarm his missiles and win the game.

One of the first things you'll notice about Impossible Mission II is the improvement in the graphics as everything is now in 3D, then you'll notice the different types of security robots and they are just as deadly as the originals. Now alongside the original sentrybots there are Minebots that lay explosive charges, Pestbots that ride up and down on the lifts, Squatbots that bounce up to give you a lift or squash you against the ceiling, Bashbots that push you off platforms and Suicidebots that are determined to leap into oblivion taking you with them.

Once again, you must search everything including the kitchen sink to find plugs to disconnect the robots, programs to reset the lifts and numbers to crack the codes that lead from tower to tower.

Epyx is probably best known for The Games Series of games and the company has just fought off tough competition to get the official Olympic logo for the forthcoming The Games: Winter Edition that features Downhill and Cross Country Skiing, Figure and Speed Skating, Luge, Slalom and Ski Jump. No doubt, The Games: Summer Edition is waiting in the wings.

Gold, Silver and Bronze will allow disk users to catch up with the events they missed as it contains Summer Games I, Summer Games II and Winter Games in a 23 event single pack.

That's not all, as Epyx also plans to release Streets Sports Soccer for those who remember playing football in the street, Word's Greatest

Baseball and World's Greatest Football for fans of American sports and 4x4 Off Road Racing if you want to take the races off the tracks and over some tough terrain.

Strategic Studies Inc.

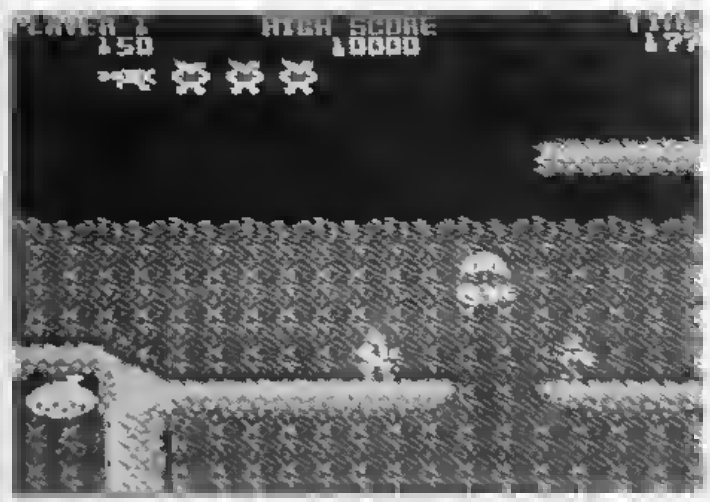
SSI, as it is better known, has been announcing its plans for games based on Dungeons and Dragons and more quietly adding to its range of Science Fiction, Fantasy and War strategy games.

SSI battled with the likes of Electronic Arts and Microprose to sign up the five year computer game rights for the Advanced Dungeons and Dragons roleplaying system. Then through its joint venture with US Gold it has developed an initial range of three D&D products and plans a fourth

The Pool of Radiance is the first SSI role-playing game based on the Forgotten Realms AD&D package. It will follow the style of many of SSI's role playing games such as Shard of Spring and Questron but uses the AD&D combat and magic system and adds graphics to illustrate the party characters and monsters.

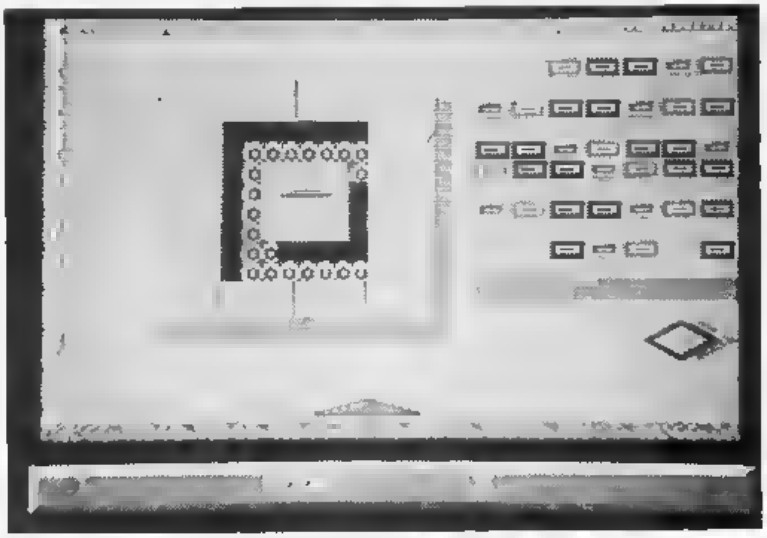
Heroes of the Lance is US Gold's first contribution to the deal and is a sideways scrolling action game based on the characters in the first of the DragonLance modules, Dragons of Despair. Although, all eight characters are included in the game, only the pointman appears on the screen, but you select any character at any time.

The mission given to your party is to delve deep into the ruins of the temple of Xak Tsaroth battle with monsters that range from



Giant Spiders to the undead as you search for the precious disks of Mishakal that are guarded by Khisanth, an ancient black Dragon.

Dungeon Masters Assistant, subtitled Volume 1:Encounters, is a program packed with the information stored in the AD&D Monster Manuals I and II and aimed as a play aid for D&D dungeon masters. At the touch of a key the DM can access over 1000 encounters and 1300 monsters detailing all the DM will need to know to control the battle



and assign experience and treasure once the combat is over

Hillsfar is a project still in development and according to US Gold will be a Winter Game style game in which a character will train through a series of events before loading into one of the other scenarios

This is just the tip of the iceberg as there are still over four years of the deal to run and many more games in the pipeline

Roleplaying adventurers that want to save a world now can invest in the Eternal Dagger which is the sequel to SSI's Wizard's Crown and like the original it is a combat based game

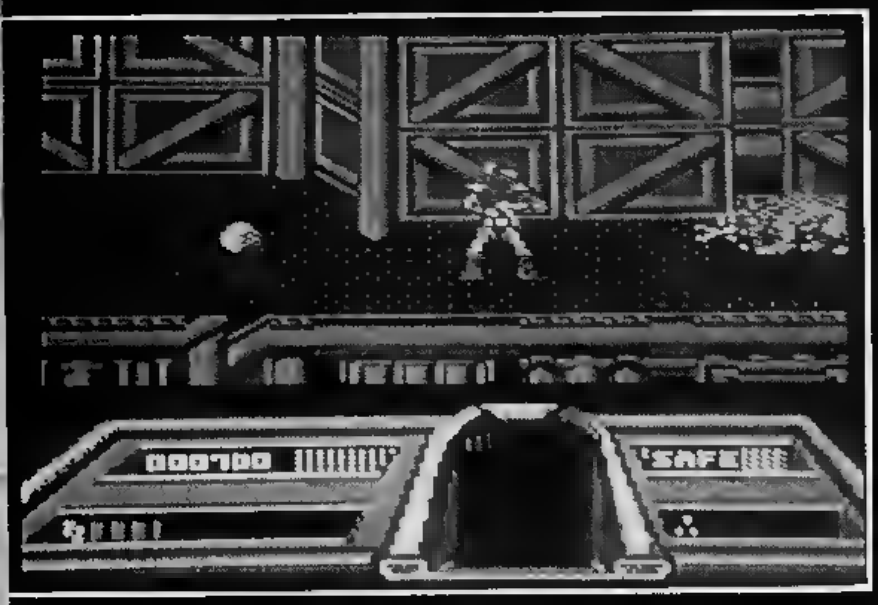
There are spells to cast, guests to perform and even a princess to rescue but the emphasis is on the tactical level combat system in which you control every move and action of your characters in a battle. Unlike other games where you simply decide whether to attack or defend or cast a spell in this game position, facing and angle of attack are important. A wargamers' role playing game.

Roadwar Europa is the sequel to Roadwar 2000 and contains the same mix of gangs battling with armoured cars, trucks, bikes and anything else they can lay their hands on. This time the post holocaust action comes to Europe. The cause of the holocaust was a bio-war but now a terrorist gang threaten to add to the chaos by exploding five dirty nuclear devices.

Naturally, it's your job to stop them by tracking down and disarming the bombs and catching the gang involved and you can even get a head start by loading in your old but well equipped gang from Roadwar 2000 or start again from scratch.

Shiloh is the second in SSI's American Civil War series and uses the same game system pioneered in Gettysburg the Turning Point. The battle of Shiloh was General Grant's first real test as a commander when he found his 45000 men ambushed by General Johnson's Confederate army and to make things worse he had his back to the Tenessee river.

Three levels of battle between units that



include the gunboats *Lexington* and *Tyler* displayed either as symbols or icons will present a challenge to all computer Generals.

GOI

GOI was launched by US Gold as a label through which it could release its own UK developed software. Now through a deal with Epyx in the States US Gold is at last reversing the one way flow of imports.

Lazer Tag is a game based on the top selling toy guns and is set in the year 3010 when you are transported to the Lazer Tag training camp where you must graduate from Neophyte (rookie) to Rabbitoid by battling through the Lazer Tag Arenas.

Each Arena is filled with opponents armed with the same gun and separated only by skill. To proceed to the next stage you must score six hits before you are shot six times. It sounds simple but the 3D scrolling Arena's filled with traps and rebound shields so you can shoot yourself and ensure even the low levels are a challenge.

Jinks claims to be a completely new angle in computer fun when it actually presents a new angle of a computer classic, Breakout. Yes, I know Breakout has already been reworked in Arkanoid and Impact but this game is actually different as the game is played over a series of sideways scrolling screens.

The object of the game is as always to clear the screen of bricks by controlling a ball with a bat. Only this time the bricks are spread around a massive play area and if you lose control of the ball it can take quite a while to find it again before you can get it back under control.

To add to your troubles there are also ball munching and bat crunching aliens that patrol the screens as well as those that make your bat smaller although you can also find bonus squares offering a new ball and bigger bat.

Capcom

Capcom coin-op conversions have risen from the ranks to a label of their own through games such as Sidearms. Now you can experience the action of futuristic commando raids in Bionic Commando. Armed with a telescopic arm and a laser rifle you are sent on a dangerous mission to infiltrate the enemies' base and neutralise the Zargon missiles that are set to destroy the world.

US Gold

Finally, the US Gold label still produces a strong line up of games including this month's two coin-op conversions Infiltrator II and more courses for Leader Board fans and the weird and wonderful Dream Warriors.

Shackled is the latest in a long line of Gauntlet clones which features in this, the Data East version, your attempts to rescue your comrades from a mysterious castle.

Desolator is a conversion of the Sega coin-op game Halls of Kairos and is a top down scrolling beat em up with enough punches, kicks and opponents to keep you going until you reach your goal and release the Infants held behind mirrors by the evil Kairos. Only then, can you break the spell and transform into Machoman the desolator.

Infiltrator II: The Next Day represents great value for money. Johnny "Jimbo-Baby" McGibbets returns to fight the Mad Leader by flying through enemy space in his Whizzbang Enterprises Gizmo attack helicopter before infiltrating the enemy base. Not only do you get three more missions, the last one to install a brain implant on the Mad Leader, you also get Infiltrator I in the same box.

Famous Courses of the World Volume 2 is the latest from the bleed an idea dry department and presents four more courses for club wielding Leader Board fans. This time you can tackle Dorado Beach, Harbour Town, Pine Ridge and Sunningdale that's considered to be the best course in the world.

Finally, in Dream Warrior you don't die, you just wake up! It is set in a strange world where the World's fate is controlled by Demon summoning, feuding Focuses each competing to become Master Focus. Unfortunately, the battle is turning everyone insane and so you have decided to dream yourself into the battle to find and defeat the Focuses' ultimate monster, the Dream demon.

High-speed graphics

In the first part of our new series, Allen Webb explains how to get your C64 set-up and ready

To the Basic user writing a game with effective graphics is difficult. True, you can set up interesting displays but the speed of execution precludes the use of more unusual effects. The purpose of this series is to provide a toolkit which will allow you to use sophisticated graphics with Basic. Due to the limitations of Basic, the writing of arcade games is out of the question. This series will, however, be of use to those of you who want to write such games as graphical adventures and strategy games which are not so speed dependent. The series will comprise of six parts and will cover the following areas:

1. A raster-driven graphics environment
2. A memory display module to allow the display of maps or backdrops.
3. a module for the display of 3D maze views
4. A sprite control module
5. A storage/retrieval system for screens. The use of repeating functions for maze generation.
6. Various graphics utilities.

As far as possible I will describe the theory behind the code and provide enough detail to allow you to tweak it.

Where it is

The first main aspect to consider is the memory format to be used. The C64 is extremely flexible allowing a wide range of memory configurations. In order to allow the most flexible system, I have opted to leave the screen memory in its normal position but to raise the start of Basic to allow access to sprite and character data. If we raise the start of Basic to $4000 (16384) we have the chunk of memory from the normal start of Basic, $0800 (2048), up to $3FFF (16383) to use. The system uses Rom images for the character sets from $1000 (4096) to $1FFF (8191) so we can't use this for our own character sets. We can, however, use it for the machine code. The portion from $2000 (8192) to $3FFF (16383) can be used for characters and sprites. The intended memory map is therefore:

```
$0800–$1FFF: Graphics code
$2000–$27FF: Redefined character set 1
$2800–$2FFF: Redefined character set 2
$3000–$3FFF: 63 sprites.
or if you don't want sprites.
$3000–$37FF: Redefined character set 3
$3800–$3FFF: Redefined character set 4
```

This arrangement should be more than sufficient for most needs and leaves about 24.5K for Basic use. This may not seem much room for the program but the package will also access the area under the Roms to give about 20K of data storage.

Before you use any of the routines described, you must raise the start of Basic with the command:

```
POKE 44,64: POKE 64*256,0: NEW
```

The normal 64 display is to a degree limited in that you are confined to one set of parameters, ie:

The character set as specified by bit 1 to 3 in location 53272
Screen colour defined by location 53281
Border colour defined by location 53280
Multicolour 1 defined by location 53282
Multicolour 2 defined by location 53283
Character type as defined by bit 4 of location 53270

The first module in this series provides a raster-driven routine which allows you to create more complex displays. The routine monitors the movement of the screen raster and creates separate horizontal zones at specified vertical positions on the screen. Each zone can have its own set of parameters as described above. This means that you could have a screen full of horizontal stripes, use four different character sets on the screen at once or mix multicolour and normal character modes.

Two routines are given, one sets up five zones and the other sets up 25 zones. Since they occupy the same areas of memory, you may use only one at a time.

Each zone has its parameters set up in a table. As the position of the raster is scanned, the correct set of parameters is used for each zone. The routines occupy the following blocks of memory:

Five zones: $0828–$09CA (2088-2506)
Twentyfive zones: $0828–$0A67 (2088-2663)

The greater size of the 25 zone routine is due to the extra length of the parameter tables.

The routine have four entry points:

SYS 2088: This switches on the interrupts using the current parameter tables. The initial values give a set of grey stripes.

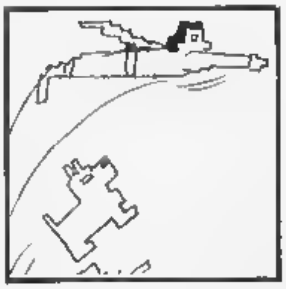
SYS 2091,ZONE,ME,BC,SC,FLAG,[MC1,MC2]

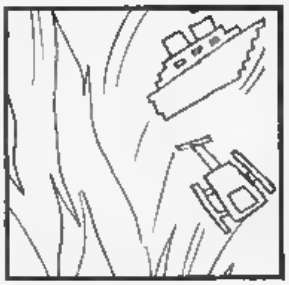
This routine changes the parameters for the specified zone. The parameters are:

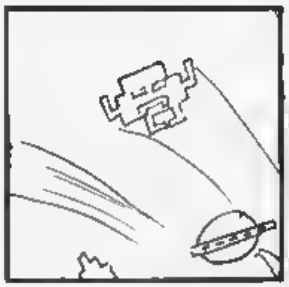
ZONE: the number of the zone to be changed. For the five zone routine values 1 to 5 are accepted. For the 25 zone routine, values of 1 to 25 are allowed. Zone 1 is at the top of the screen.

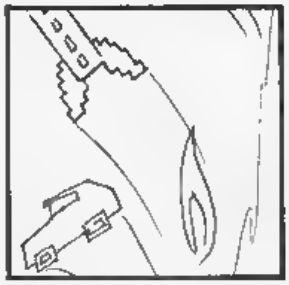
ME: This specifies the character set to be used. The values accepted are:

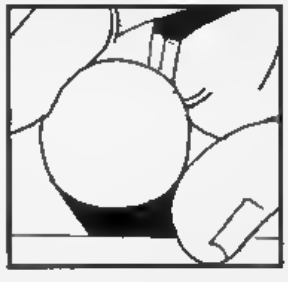
ME= 20 for normal Upper case set
ME= 22 for normal lower case set
ME= 24 for redefined character set 1
ME= 26 for redefined character set 2
ME= 28 for redefined character set 3
ME= 30 for redefined character set 4











Any other values will give garbage.
BC,SC. these are the border and screen colours, respectively.
FLAG: If this is zero, then normal high resolution characters are used. A non-zero value will set up multicolour characters.
MC1,MC2: these are needed only if multicolour characters are needed. They specify multicolour 1 and 2.
SYS 2094,START,END,ME,BC.SC.FLAG,[MC1,MC2]
This call alters the range of zones from the start value to the end values. The rest of the syntax is exactly as for the previous call.
SYS 2098,ME,SC,BC,FLAG,[MC1,MC2]
This call disables the interrupts and sets the whole screen to the specified parameters. You should use this routine whenever you wish to access disk or tapes during the program.

Maximum flexibility

Two routines are given to allow the maximum flexibility. The 25 zone routine sets each zone to a line of characters. This gives the widest range of options. The five zone routine gives the following arrangement:

```
Zone 1: 5 lines high
Zone 2: 6 lines high
Zone 3: 4 lines high
Zone 4: 5 lines high
Zone 5: 5 lines high
```

This arrangement is such that the 3D routine given later in the series will just fit in the top two zones. (The display given by the 3D routine is 11 characters high and wide).By its nature, this package uses code which lives in odd areas of Ram. This being the case, the ability to LOAD and SAVE such code easily is a must. The ideal solution is the use of a good quality machine code monitor. You should ensure that the monitor is able to save code in a relocatable form. This is vital if you use a character designer to create character sets to load in other locations. There are a number of excellent public domain monitors. My own favourite, however, is the Zoom monitor from Supersoft. To help those of you who have no monitor, the SAVEALL routine will save any block of memory except for that under the Kernal Rom. The syntax for this routine is:
SYS 870 "Filename",Device,2,Start address,End address
where Device = 1 for cassette and 8 or 9 for disk.
To LOAD a file SAVEd with this routine, you must use a secondary address of 1 to force the code to LOAD in the correct place, ie:
LOAD "file",8,1 or LOAD "file",1,1
If you LOAD such files in direct mode, you will muck up the Basics pointers and you will need to enter NEW. For this reason, LOAD binary files before you enter any Basic.

While you can work with the Basic loaders, it is easier if you use binary files. The process is quite simple.

1. Raise the start of Basic by typing in POKE 44,64:POKE64*256,0: NEW: RETURN
2. LOAD or type in the loader
3. RUN the loader
4. SAVE the code using either a machine code monitor or the SAVEALL program. The relevant addresses are

	Start Address	End Address
5 Zones	2088	2506
25 Zones	2088	2663

Using the system

Finally, some words as to how to use the system with your programs. Eventually you will have a mass of machine code, character sets and sprites which will reside below the start of your Basic program. We need a method of LOADing, relocating and then RUNning your program. To save you messing about with countless files, we will save the code etc with your Basic program. This will, however, make your Basic programs roughly 14k longer than usual.

In the listings is a small routine called BOOT.GEN. Type this in *exactly* as given (no extra spaces or other changes). RUN it and delete all lines *except* for lines 10 and 20. SAVE the program. The procedure for setting up your program is then:

1. Reset your computer with SYS 64738 or switch if off and then on.
2. Load the boot program (the two line program resulting when you RUN BOOT.GEN)
3. Type in POKE 44,64:POKE64*256,0: NEW RETURN in direct mode. This relocates the start of Basic.
4. LOAD and RUN the Basic loaders for the machine code or LOAD binary files. If you use the Basic loaders, it is important that you do this in sequence starting at the lowest in memory working upwards. This is due to the data generator I use working in 16 bytes per line. This generates a loader which may be a few bytes larger than the code it converted. By loading the code bottom upwards, you will not accidently overwrite any code. You will not have this problem, however, if you use binary files.
5. TYPE in or LOAD your Basic program.
6. Enter POKE 44,8: RETURN in direct mode. This returns the start of Basic to its normal position. If you LIST the program at this point, you will see just the BOOT program. SAVE the program.

If you want to edit the program at a later date:

1. LOAD the program
2. TYPE in POKE 44,64 RETURN
3. EDIT your program
4. SAVE the program by using step 5 above.

We know now how to set up our graphics environment. Next issue will look at how to use it for maze and landscape displays.

Disk dungeons

News and views from the adventure world

By Gordon Hamlett

Once again, there are no adventures as such to write about this month, only two superb role playing games, Bard's Tale III and Wasteland. Indeed, there is only one adventure as such on the immediate horizon (although no doubt several will drop on my desk in the next week to make me look stupid yet again) and that is Corruption from the pens of Magnetic Scrolls and released by Rainbird.

Anyone who has played and enjoyed MS's previous releases - The Pawn, Guild of Thieves and Jinxter - may be in for something of a shock with Corruption. Gone is the amusing storyline, full of jokes and wonderfully silly locations. Instead, you are trying to prove your innocence in a murder that you have been framed for in a storyline that also features illegal business practices such as insider dealing and drug trafficking. An integral part of the plot will be persuading other characters to help you as well as clearing your name.

Role Playing Games are definitely replacing the traditonal adventure though and are currently the major area of software development over in the States so it looks as though they are here to stay. Not everybody likes them though and it is worth while looking at some of the pros and cons.

The first objection and quite a strong one at that is the name! People who spend many hours playing non computer RPGs such as Dungeons and Dragons or Runequest argue that these computer games are nothing like the real thing and so should be called something else. The whole essence of role playing is character interaction and this is something that the computer will never be able to mimic properly.

Whilst this is true, it also somewhat pedantic. It is convenient to hang a label on a particular type of game so that everyone knows instantly what you are talking about. What else could they be called? Multi character fantasy exploration and quest games? Games that mimic Dungeons and Dragons but are lacking all the best bits? No, the name is perfectly OK. After all, sitting down in front of a monitor and keyboard solving puzzles is hardly an adventure is it?

Another point that is frequently overlooked is that the genre of computer RPGs is still very young and evolving all the time. I seem to remember that when I started playing D and D back in 1976, everything then was very much hack and slash with little or no thought going into either location settings or storyline. I would venture to suggest that the plot behind Wasteland is infinitely better than anything I ever played in those far off days.

Wasteland

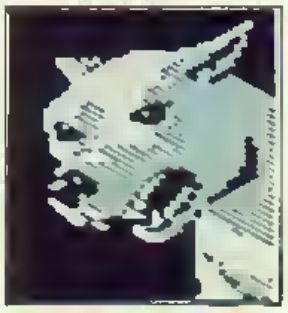
Two weeks before the American Star Station Citadel was due to become fully operational, it started transmitting a distress signal. Everything seemed to escalate from there with each Superpowers accusing the other of assorted malpractices. The inevitable happened as it looked as though the year 1998 was going to mark the end of civilisation.

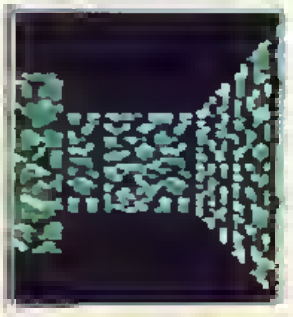
Not everything was destroyed in the holocaust though. In particular, a group of engineers, working in the desert areas of southwest America escaped most of the post-holocaust damage. They liberated a prison near where they had been working, turning the prisoners loose.

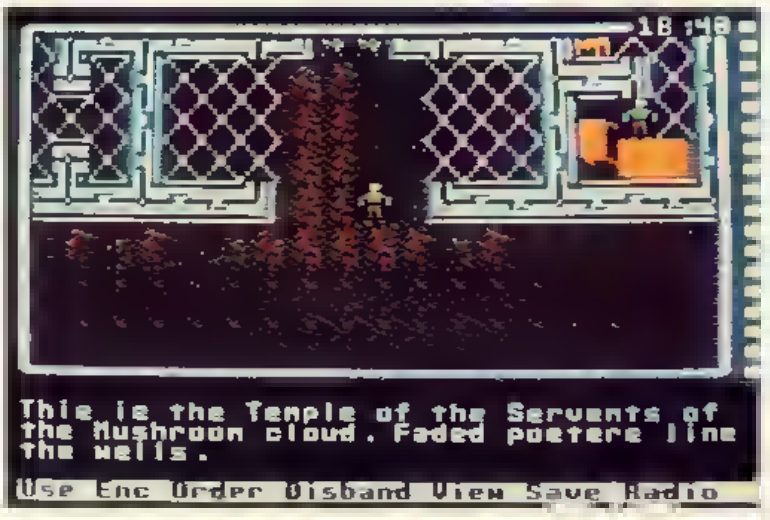
In the weeks that followed, other survivors turned up and eventually, the Ranger centre was formed. With a desire to help other communities that might likewise have survived Armageddon, a peace keeping force of Desert Rangers was founded. When news of strange occurrences in some of the local settlements started filtering through, it was only natural that the Rangers should be the first to go and investigate.

Wasteland is a post-holocaust role playing game. As such, it is the first game of this type to break away from the fantasy mould of dragons and dwarves. For that alone, the game must be applauded but there is more to Wasteland than that. It is certainly the most atmospheric rpg that I have come across for some time and one of the few games that I have played recently that has kept me up into the wee small hours.

You start off with a party of four characters although this number can be expanded to seven if you can persuade other people to







join your cause. Although you can construct your own characters, there is a preset party included and, even if you do not intend to use it, it is well worth while having a good look at it before you start.

Each character is made up of seven different attributes-strength, intelligence, luck, speed, agility, dexterity and charisma. The higher each attribute, the better. In addition, each character starts with a certain number of constitubon points that represent the state of his or her physical well being throughout the course of the game. The attributes represent your basic chances of success when it comes to leaping on tables, finding items and talking your way out of trouble

One attribute has particular importance throughout the game and that is intelligence. How clever you are determines how many skills you will be able to learn as the game progresses. In the beginning, you are assigned a number of skill points equal to your IQ. These can then be spent learning from an initial list of twenty seven different talents although more become available later on in the game

Again, your intelligence determines what skills are available to you. Thus only the brightest can study cryptology whereas even the average CDU reviewer can master the art of brawling. Amongst the skills on offer are proficiency in using various weapons ranging from the simplest hand gun through sub machine guns all the way up to anti tank rockets. Another range of skills include the thiefly arts – picking locks, disarming alarms and bombs. Medical skills are a must and you can also learn to specialise in bureaucracy, forgery and repairing broken toasters (don't laugh).

At a glance
Title: Wasteland
Supplier: Electronic Art, Langley Business Centre, 1f/49 Station Road, Langley, Slough, Berkshire SL3 8YN
Price: £16.95
Sound: Sirens, nuclear detonations, geiger counters
Graphics: Utiltavian
Playability: Not exactly perfect, but on the way
Addictiveness: A wee small hours job, this

Constant use of a particular skill will lead to you becoming better acquainted with it and earning a field promotion in that particular talent as it were. The other way of improving yourself is to earn sufficient experience points to warrant a genuine promotion. With each rise in rank, so you get two points that you can add to any of your attributes. Add them to your IQ and you get the chance to learn new skills the next time you visit a library. Unless you have a really duff characteristic, it is woth while bumping up your IQ as much as possible. This handling of skills throughout the game is undoubtedly one of its strongest features and it works exceptionally well. There is always just a little bit more that you want to do than you actually have the talent for.

Once the party has been established, it is time to start exploring. The area outside the Ranger Centre is hostile both environmentally and by nature of the creatures to be found. To start with, most of the land is desert and wandering too far into the interior is likely to bring about a severe case of heatstroke. There is also the fact that there are still vast pockets of radiation lying around - the silent killer and so a portable geiger counter should be an essential purchase

Living in the desert are a variety of vermin and society's misfits, all of whom are desperate to survive at your expense. Weapons range from fists through clubs, hand guns, rifles, machine guns, assault and anti-tank weapons through to such delights as proton axes although obviously, you are not going to take on a thug with a LAW rocket.

As you wander round the desert, so you will discover towns and settlements to enter. It is here that your adventures really begin. It is difficult to say quest for at no stage do you actually know what the ultimate aim is although there definitely is one. Instead, you are fed snippets of information about what is going on with mini tasks to complete.

Towns consist of many buildings, all of which can be individually explored. There are shops to replenish your supplies, libraries to enhance your skills and hospitals but the meaty part of the game comes from the other places. Various mutants abound. There are bars to meet people. Strange cults to get to grips with. The Bloodstaff followers for example, inextricably linked with a nasty series of murders. The cult of the Mushroom Cloud whose temple is built around the remains of a nuclear power station. There is a power struggle taking place in Las Vegas - which faction will you choose to support? And all the time, strange war machines abound. Slicerdicers, three marks of Warroid – a sort of cross between a tank and a robot and even worse, the armoured Scorpion droid.

The game itself looks like a cross between Ultima IV and Bard's Tale. There is the top down approach used whilst exploring and then individual pictures for combat etc. There are some nice sound effects too to accompany some of the action, notably when you are blowing something up. The game is large. It comes on four sides of disk and as a general rule of thumb at the start of your campaign, the higher the disk number, the harder the more dangerous the opposition is going to be.

Controlling the game is simple, there are just a few key strokes to be learned with a menu at the bottom of the screen to remind you of your options. That and the direction keys are all you need to know. You are prompted for anything else that is required.

Wasteland is not quite perfect and there are a few features that begin to annoy. Desert encounters are not structured according to the strength of your party and it becomes something of a bind to keep having to fight one iguana at high levels. Communication is

also something that could be improved. At the moment, you have to walk into people to see if they want to say something to you although at the higher levels of the game, encounters tend to be better organised. It would also be nice to know what your hired characters are thinking or suggesting. One of them started to disobey my every order but I never found out why.

These really are minor niggles though and overall, Wasteland is superb. The atmosphere created is totally credible and by far the best of the role playing games currently available. The new features of the game work admirably and the entire game system plays very well! The structure of the game, although largely linear has been put together in such a way that you always want to explore just a little bit further. A truly excellent game.

Bard's Tale III

As cassette users finally embark on the Bard's Tale trail disk users can now surge ahead with the third part in this superb role-playing series.

Remember in the original that when the going gets tough the Bard goes drinking? In this game things have got so tough that the Bard is scared sober! The fighters are all thumbs and the Magic Users are speechless! According to the title the answer lies in the smaller sneakier approach of the Thief of Fate.

Although, you can load in your party from Bard's Tale I and II don't expect things to be as you left them as the Mad God Tarjan has been at work and has left Skara Brae in ruins to you'd better just forget about Roscoe's Energy Emporium or The Equipment Shoppe as these have been flattened. Indeed the game begins in a refugee camp just outside the once great city. The days when you battled with the Wizard Mangar now seem a fond memory.

A letter from a dying man will snap you out of this despair as get you gathering your party together to save the world.

It now seems that Skara Brae wasn't the only target for the Mad God Tarjan and he is now planning the destruction of the six cities of the plains and the extinction of all life that is not one of his own.

Your quest is immense as you must build a party to travel through the dimensions defeating Tarjan's minions wherever they lurk until you meet the Mad God himself in battle that will decide the fate of the world.

As your party of level 1 and 2 characters assemble it is clear that a lot must be done before you can even begin the quest so you must first set your sights on the starter dungeon that is designed to "bring you up to speed". As Bard's Talers will know a starter dungeon in this game means a collection of monsters and traps that will require at least level 12 characters to conquer so your initial games will be quick forays into the depths of the Temple to Tarjan that's still left standing in the ruins.

Thankfully, the review board still stands but is now manned by a single old man who will manage level gains, the teaching of new spells, provide a source of information and advise over changes in character class.

Bard's Tale III is bigger than its predecessors containing over 500 monsters, the choice of 110 spells, 7 dimensions to explore, 84 dungeon levels to delve into and two new classes of Magic User. The Chronomancer is the only way to travel to the other dimensions and get on in the game however the training is long and hard as the Magic User must have completed all the spells in three magic classes and then he loses them all in return for some potent magic. As a wielder of the magic of time a Chronomancer can send and recall creatures to and from the grave and deal out some hefty blows such as a God Fire for 240 points of damage and the aptly named 1500 point Fatal Fist.

The Geomancer provides an answer to the critics that complain that fighters have a raw deal in roleplaying games. They battle away to keep the Magic Users safe until they are overtaken when the magic power goes to their pointy heads, Now, if a fighter can find the right location in the game he can turn to magic and become a Geomancer.

He will forfeit his special abilities such as a monk's armour class bonuses, a hunter's critical hit capabilities or a Paladin's multiple attacks but will be able to use most of his weapons and gain an arsenal of impressive offensive spells. For example, the level one spell Earth dagger inflicts 200-400 points of damage on a group 40 feet away! Others includes a turn to stone spell, others that show all the magic regeneration, magic drain and healing squares in a dungeon and the Earth Maw that drops a group into the bowls of the Earth from 50 feet. It's like carrying around a portable earthquake.

Bard's Tale III is also easier to play as it allows you to save the game at anytime and anywhere in the game and includes auto mapping features so you can concentrate on the action and leave your scribe at home. This also reduces the effect of darkness areas in a dungeon as you can easily guide your party through them using the disk accessed map.

Bard's Tale III is one of the best roleplaying games you can load into your C64. Happy adventuring.

AT A GLANCE

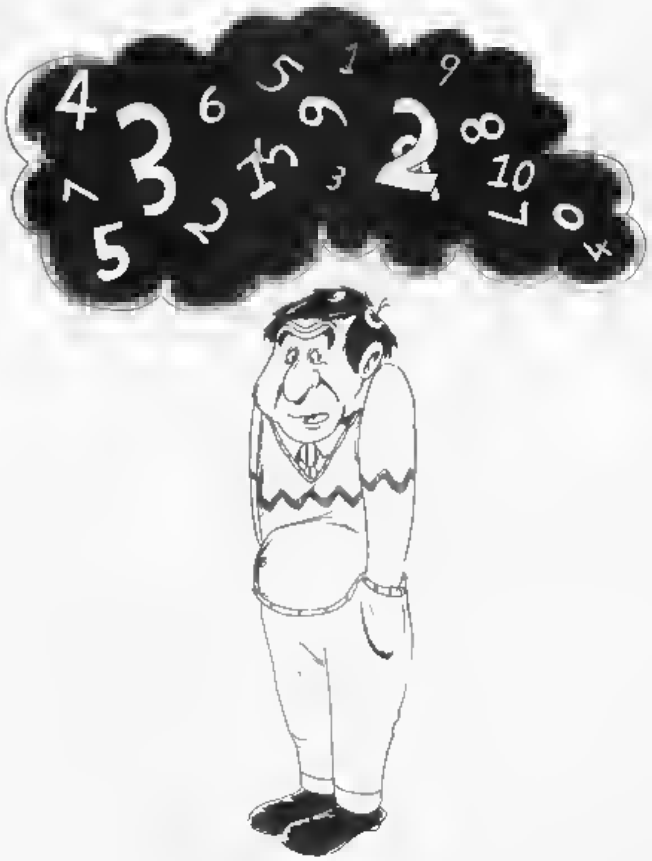
Title: Bard's Tale III – The Thief of Fate
Supplier: Electronic Arts, Langley Business Centre, 11/49 Station Rd., Langley, Slough, Berkshire, SL3 8YN.
Tel: 0753 49442
Price: £14.95
Graphics: Animated monsters and dungeon corridors
Sound: Not a lot.
Playability: Made easier by auto mapping and save anywhere
Addictiveness: Incredibly.

Bytes dog Man

If binary binds and hex vexes, this should make it all a bit clearer.

By Eric Doyle

Computers can be controlled by working in decimal but it's like always driving a car in reverse gear. You still get from A to B but your view is limited and progress is slow until you discover the clutch and gear changes. Binary and hexadecimal systems hold the key to total control of the 6510 chip and the benefits in speedy machine code programming open up a whole new world of computing power.



For centuries the only numering system used was decimal or denary. Based on groupings of ten, it would seem natural to assume that it developed from the fact that humans have ten fingers. Consequently, if we had been born with 16 fingers we would probably naturally count in groupings of 16.

To understand how numering systems work, it's best to consider a set of tumblers built into a revolution counter on a bicycle wheel. Each tumbler is numbered from zero to nine and, every time the wheel rotates, a pin fixed to one of the spokes strikes a sprocket which turns the first number causing it to display a new number. When this tumbler completes a full rotation, another pin latches into the sprocket driving the second tumbler causing it to click on once. Nine more clicks on this tumbler makes a third tumbler rotate and so on along the row of tumblers. Each tumbler keeps track of each group of ten turns of the neighbouring tumbler to the right. If the tumblers read 00043, the value is 4 multiplied by ten with an extra three to be added on: 43.

This is the basis of the decimal system and the basis of the system is groups of ten, or "base ten" as it is more correctly called. As you can see the base is derived from the largest number in the system plus one (9+1=10).

Sweet sixteen

Going back to our example, consider what would happen if we replaced the sprockets for ones which had 16 teeth instead of ten and we numbered the tumblers from zero to 15. Now the second tumbler would only turn when the first tumbler had clicked through all the values from zero to 15, so although the counter would read 10 after one full rotation of the first tumbler, the number actually means one unit of 16 plus no extra

turns. Instead of a pair of tens and units tumblers we have 16s and units tumblers. The value 43 would translate as four multiplied by 16 plus an extra three: 67 in the normal decimal system.

What is the base of this system? Well, according to our formula, the highest value in the unit column is 15 so the base is 16(15+1), the hexadecimal system. Hex is an abbreviation but can cause confusion. Hex means six not sixteen as in hexadec-imal, hexadec would have been a more suitable contraction.

If the second column counts the groups of 16 wheel turns, the third tumbler clicks on one after each 16 turns of the second tumbler, 16 multiplied by 16 gives 256, therefore the third column counts groups of 256 wheel turns on the bicycle.

But what value is this - 1137 It could be one group of 256 plus one group of 16 plus three (1-1-3), or it may be 11 groups of 16 plus 3 (0-11-3), or it could even be one group of sixteen plus 13 (0-1-13)! To avoid this confusion we must create a set of characters to represent the numbers from ten to fifteen. Conventionally the alphabetic characters A to F are used to represent these values.

If the hex value 113 is now written down it could only possibly represent the hex equivalent of decimal 272 (1×256 + 1 × 16+ 3). The other numbers would be represented by B3 - eleven groups of 16 plus three (dcimal 179) - and ID (16+ 13) which would represent the hex equivalent of decimal 29.

If you now see the number 54 then you could now be forgiven for confusion. Maybe it's decimal 54 or it could be hex 54. To denote the difference we will have to use prefixes. Decimal numbers rarely carry a prefix to avoid confusion the hash sign can be used- # 54. Hex numbers should **always** be preceded by a dollar sign: $54.

One and one makes...

Now we can consider what would happen if only two numbers were written on each tumbler, zero and one. When the wheel turns the first tumbler clicks up a one but the second turn returns this to zero and sets the second tumbler to a one. The number base would now be two (1+1), a system which we know as binary.

The third tumbler would turn when the second tumbler had clicked twice or for every four turns of the wheel. The sequence from the rightmost tumbler towards the leftmost would be units, twos, fours, eights - each column two times its predecessor.

Written down the value 11 would represent one mmultiplied by two plus one, a value in decimal of 3 or in hex of $3.

To differentiate between # 10, $10 and binary 10, the prefix is %. A binary value of %1010 would give: 0 + 1×2 +0×4 + 1×8. In decimal this is # 10 and in hex it would be $A.

Consider now the value %1111:

1×8 + 1×4 + 1×2 +1

This could be written another way:

(2×2×2) + (2×2) + (2) + 1

These values can be expressed as powers of two:

(2 ' 3) + (2 ' 2) + (2 ' 1) + (2 ' 0)

As can be seen, the figure following the arrows is the number of times the figure before the arrow must be multiplied by itself. Similarly, 10 ' 3 (ten to the power three) would be 10×10× or 1000 and 5 ' 2 would be 25. Any number to the power zero always equals one.

Computers use binary because it provides an accurate way of storing numbers electrically. If you stick a finger into a mains socket there is no doubt in your mind whether it is turned on or off!

In our tumbler illustration the possible values were zero and one. Substitute each tumbler with a switch and the switch can be either off or on. When a switch is off it has a value of zero, when it is on then the value is one.

Inside the C64 there are 524,288 switches each representing a single Binary digIT (hence the term a "bit"). These bits are grouped into 65,536 groups of eight bits called binary eights or bytes (bi eights). This means that the maximum value that can be represented, or stored, in a byte is %11111111, all eight switches turned on.

(2 ' 7)+(2 ' 6) + (2 ' 5)+(2 ' 4)+(2 ' 3)+(2 ' 2)+(2 ' 1)+(2 ' 0)

128 + 64 + 32 + 16 + 8 + 4 + 2 + 1

This gives a decimal value of 255 which probably agrees with what you've learned when trying to POKE values into bytes from Basic. The trouping of bits into eights results

in the practise of always expressing a number as an eight digit figure in binary. This even applies to a value such as %1 which is more correctly written as %00000001.

Covering the bases

When numbers have to be converted from one base system to another there are rules. What is of more interest at the moment is the way in which hexadecimal and binary relate.

Why add to the decimal and binary complications by introducing a third numbering system? A look at the relationship between hex and binary shows a useful correlation.

Hex columns run in the series unity, 16, 256 (or 16×16), 4096 (256×16) and so on. A full byte in binary is one less than 256 in decimal ($100). In decimal the number which is one less than 100 is represented as 99 or, to put it another way, a number with one less column but a maximum value in each. In hex a maximum column value is denoted by the letter F therefore one less than $100 is $FF.

We've seen how a byte is made of eight bits but there is a unit between the two, the nybble. This consists of four bits and it has a maximum value of %1111 which equates precisely with $F, both resolve to decimal 15. This is important as a programming aid. Twenty years ago all computers were programmed in binary which meant that a large number would be represented by a very long string of zeros and ones:

%1001101110001101 = # 39281

Debugging page after page of such figures was a long and arduous task. Calculating the decimal value meant a long series of additions. Then came hex.

Split the number into its coomposite nybbles and treat them as separate numbers:

%1001 %1011 %1000 %1101
%1001 = # 9 = $9
%1011 = #11 = $B
%1000 = # 8 = $8
%1101 = #13 = $D

The number in hex is $98BD:

```
 9 × 4096 = 36864
11 ×  256 = 2816
 8 ×   16 = 128
13 ×    1 = 13
           -------
           39281
```

There is a direct relationship between hex values and nybbles so to convert from hex to binary is easy:

$	A	F	2	8
%	1010	1111	0010	1101

This makes error checking easier. Find %1001111001110110 in the following list:

%1011110011101100
%1001110001110110
%1001111001110010
%1001111001110110
%1001111000110110

Now converting these to their hex equivalents, find $9E76 in the following list:

$BAEA
$9A76
$9E72
$9E76
$9E36

The hex number becomes a lot clearer and yet it can quickly be converted to its binary value. As a result hex numbers are used to represent all values in a computer but if the bit values are required they can be quickly calculated.

Binary numbers are always represented as eight digits long. A byte in hex is two digits long so values less than $10 are always written with a leading zero to represent the empty nybble, $0F etc. Values larger than $FF have four digits, $0100 to $00FF and higher.

If the mists of mystery still cloud your mind practice and clarify base conversions between binary, hex and decimal.

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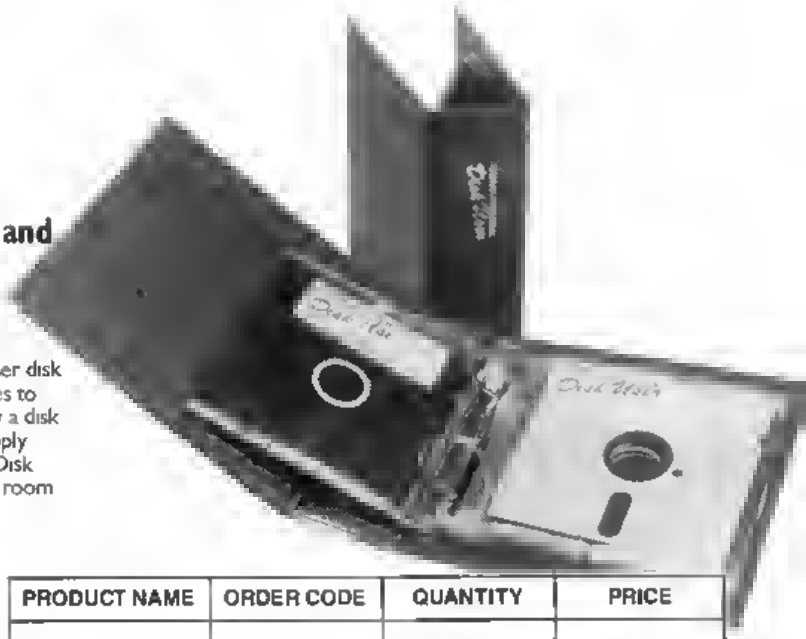

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